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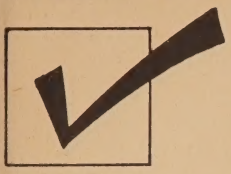

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- ☐ Cabinets
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- ☐ Changeable Letters
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- ☐ Coin Changers
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- ☐ Hardware
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- ☐ Insulation

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- ☐ Ladders
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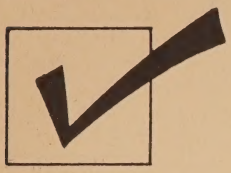

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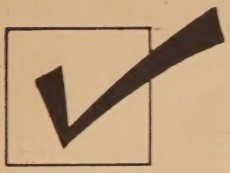

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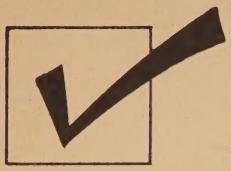

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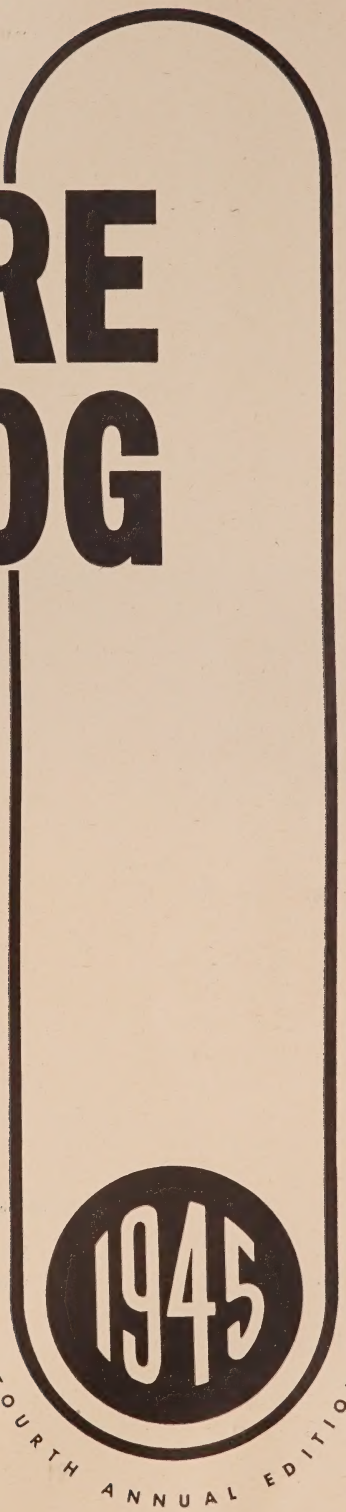

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TO
THE MEN AND WOMEN
OF THE EQUIPMENT AND SERVICE INDUSTRY

who, through quality materials and precision workmanship in the years of peace, and ingenuity and hard work in the years of war, made possible the theatres' unparalleled record as a home-front soldier, this edition is respectfully dedicated.

THEATRE CATALOG

TABLE OF CONTENTS

THE WAR YEARS AND POST-WAR FORECASTS

GOVERNMENT AND EQUIPMENT INDUSTRY IN WAR...*Allen G. Smith* X
War Production Board Case History Tells How an Industry Well Served Its Country

THEATRE SUPPLY DEALERS IN THE WAR YEARS.....*Ray G. Colvin* XI
The Equipment Dealers Did Their Share To Keep All America's Theatres Running

THE WHOLE INDUSTRY IN THE WAR EFFORT.....*Walter T. Brown* XII
A Review of the War Activities Committee In Its Coordinating an Industry's Effort

UNITED WE STAND, IN PEACE AS IN THE WAR.....*Arthur L. Mayer* XIII
Eloquent Plea Is Voiced for Preserving Gains of Industry's Wartime Cooperation

PRODUCTION AIMS FOR THE POST-WAR YEARS.....*Jack L. Warner* XIV
A Noted Producer Outlines the Principles Of Movie-Making for Tomorrow's Theatres

AMERICAN-MADE MOVIES IN FOREIGN MARKETS.....*Phil Reisman* XVI
Production Faces Bright, Prosperous Future Despite the War-Damaged European Markets

THE GOAL OF POST-WAR FILM DISTRIBUTION.....*Eric A. Johnston* XVII
A Vital Role Is Played in Entertainment Diffusing American Ideas to Whole World

THE "E" RECORD OF THE EQUIPMENT MANUFACTURERS.....XVIII
Cinema-Allied Industries Win 375 Awards, Comprising 107 Flags, and 268 More Stars

EDITORIAL FOREWORD XIX

DESIGN AND CONSTRUCTION

Section 1-A—Design

HINTS ON PLANNING THE COMMUNITY THEATRE....*Drew Eberson* 2
First Step in Design Is Study of People Who Might Be Patrons at the New Theatre

WOOD AS A THEATRE CONSTRUCTION MATERIAL..... 4
Laminated Arches, Plywood Panels Presage Coming of All-Wood Pre-Fabricated Cinemas

FUNDAMENTALS OF THE ECONOMICS OF BUILDING..... 8
Six Basic Principles of Good Engineering And Need for Expert Advice Are Set Forth

POST-WAR PLANS BY THEATRE ARCHITECTS 9-104

OBJECTIVE DESIGN FOR NON-OBJECTIVE ART .....*Frank Lloyd Wright* 9
The First "Living" Building Is Created As the Apotheosis of Functional Design

THE NEW "DRIVE OVER AND DROP IN" THEATRE..... 105
New Type of Outdoor Theatre Is Presented With Angles on Project's Year-'Round Use

APPLICATION OF COLOR DYNAMICS TO THEATRES....*Hayes Quinn* 109
Right Color Schemes Will Assure Patrons The Most for Thorough Enjoyment of Show

THE DEVELOPMENT AND USE OF GLASS FIBERS..... 112
Theatre Outlets for Fiberglas Products Include Uses as Insulation and Fabrics

Section 1-B—Construction

THE ALL-STEEL PRE-FABRICATED THEATRE 118
Methods of Mass Production Are Applied to Create New Type of Theatre Structure

STATES AND CITIES CONSIDER PRE-FABRICATION 122
Survey Indicates Mass-Produced Theatres Must Stand on Own Merits to Gain Approval

PLASTIC-PLYWOOD THEATRES FOR 16-MM. MOVIES..... 125
Morris Sanders Has an Idea on Emphasizing Belief in Pre-Fabrication, 16-mm. Cinemas

Published by

JAY EMANUEL PUBLICATIONS, INC.

JAY EMANUEL ..... *Publisher*
HERBERT M. MILLER ..... *Editor*
WILL A. WHITNEY ..... *Editorial Associate*
PAUL J. GREENHALGH, *Business Manager*
JAMES A. DALTON ..... *Advertising Manager*
M. F. GIBSON ..... *Circulation Manager*

Publishing Offices:

1225 VINE STREET
PHILADELPHIA 7, PA., U.S.A.

PRICE PER COPY:
$3.00 in the U.S.A.—$5.00 elsewhere

Other Offices

JOHN W. GUERARD
Eastern Advertising Representative
1600 Broadway, New York 19

EWING-HUTCHISON COMPANY
Mid-West Advertising Representative
35 East Wacker Drive, Chicago 1

SAM LINDENSTEIN
Western Advertising Represntative
425 So. Cochran Avenue, Los Angeles 36

Representatives also in BOSTON, ALBANY, BUFFALO, BALTIMORE, WASHINGTON, and PITTSBURGH

1945

PRE-FABRICATION IN THE POST-WAR EXPANSION ..... *Leo Yassenoff* 128
Pre-Fabricated Theatres Seen as Headache In Domestic Program of Cinema Development

ROAD SHOWMEN: OPPORTUNITIES AND PROBLEMS ..... *William C. DeVry* 129
Mobile Booths, Serving Several Theatres, Held a Boon for Cinemaless Communities

METALS IN THE SERVICE OF THE THEATRE ..... *Dr. Bruce W. Gonser* 131
The Common and Not-So-Common Metals Find Many Uses in Construction and Decoration

COPPER, BRASS, AND BRONZE AND THE THEATRE ..... *Bertram B. Caddle* 140
Lifting of Wartime Restrictions Opens Way To Wider Uses of Copper and Its Alloys

LEAD, A METAL OF MANY USES IN THE THEATRE ..... *J. Leland Benson* 141
Utilitarian and Decorative Applications Combine to Increase the Demand for Lead

MAGNESIUM, THE NEWEST STRUCTURAL MATERIAL ..... *L. B. Grant* 144
Light, Rigid, Strong, War-Developed Metal Will Have Many Uses in Post-War Theatres

A "NATURAL" FOR THE THEATRE: PLEXIGLAS ..... *Janet Newkirk* 147
The "Plexiglas Theatre" Here Presents What Can Be Done With One New Material

CHEMISTS' DEVELOPMENTS FIND THEATRE USES ..... *Frederick R. Long* 150
Lucite, Nylon, and Plastic-Coated Fabrics To Make Contributions to Post-War Cinemas

SOME FUTURE USES OF PLASTICS IN THEATRES ..... *Barrett L. Crandall* 152
A Brief Review of Possible Developments To Bring Beauty and Utility to Theatres

WAR FORCES DEVELOPMENTS IN USE OF CEMENT 154
The Utilization of Wartime Developments Valuable in Construction and Decoration

HINTS ON REMODELING OBSOLETE AUDITORIUMS ..... *Prof. Walter Sobotka* 157
Progressive Managements, Free Architects Will Create a New Era in Theatre Design

AN INTRODUCTION TO THE KNOWLEDGE OF ROOFS ..... *J. D. Stebbins* 166
Covering, Flashing, Drainage of Roofs Are Three Important Details to Consider

THEATRE DESIGN AND CONSTRUCTION IN MEXICO ..... *Francisco Jose Serrano* 168
Architect Tells About Building Activity And Some Special Problems Met and Solved

EQUIPMENT

Section 2-A—Front and Lobby

PORCELAIN ENAMEL IN TOMORROW'S THEATRE ..... *Edward Mackasek* 174
Colors and Shapes in Enameled Sheet Metal Permanently Accentuate Architect's Design

SUGGESTIONS ON THE MAINTENANCE OF SIGNS ..... *Erwin Wagner* 177
Signwork, to Pay Advertising Dividends, Must Be Treated Like a Valued Investment

TRENDS IN THEATRE DESIGN AND CONSTRUCTION .. 179
A Greater Utilization of Materials, Light Seen as Features of the Post-War Building

RUBBER MATS TO PLAY NEW ROLES IN THEATRES ..... *E. C. Lorraine* 182
New Ideas Promoting Cleanliness and Safety Will Be Realized When Rubber Is Available

THE MAINTENANCE OF HARD-SURFACE FLOORS ..... *Dave E. Smalley* 184
The Proper Housekeeping Methods Prolong Life and Beauty of Hard Floor Coverings

Section 2-B—Auditorium and Stage

PLACE OF GLAMOUR IN THEATRE DECORATION ..... *Dorothy Draper* 208
Correct Use of Scale, Color, and Comfort Forms the Basis of the Decorator's Credo

EFFECTIVENESS OF FABRICS IN THE THEATRE ..... *Joseph Maharam* 209
Needs of Sound Forced the Use of Fabrics: But They Stay as an Adjunct of Decoration

DIVIDENDS ARE PAID IN TEXTILE PROGRESS 211
New Fabrics and New Uses Share Spotlight Because of War's Demand for Better Fibers

USE OF BLACK LIGHT MODERNIZES THEATRES ..... *J. Cornell Richardson* 216
Judicious Use of Invisible "Light" Rays Makes Any House Shine With a New Lustre

INTERIOR LIGHTING—STEPCHILD OF DESIGN ..... *Howard Sharp* 218
Inside Illumination Methods Must Follow A Definite Plan, from Marquee to Screen

THEATRE CARPETS, 1946: AN INDUSTRY REPORT ..... *Technical Committee* 221
Committee of Manufacturers' Institute Tells What Is in Store in New Carpeting

GUIDE TO MAINTENANCE OF THEATRE CARPETS ..... *Technical Committee* 224
A Brief Summation of What Should Be Done To Get the Most From Your Floor Covering

THE PRINCIPLES OF SEATING INSTALLATIONS ..... *Irving C. Folger* 226
The How and Why of Seating Arrangements That Make All Seats "Best in the House"

DESIGN AND FURNISHING OF THE SMALL STAGE ..... *C. E. Tompkins* 229
While Stages Should Be in Original Plans, They Can Be Built into Almost Any Theatre

FIRE PROTECTION EQUIPMENT FOR THE THEATRE ..... *Arthur G. Sullivan* 232
What Fire-Fighting Equipment Is Needed And How It Is Used Is Clearly Explained

Section 2-C—Lounge and Toilet Rooms

TOMORROW'S TOILETS—FOR TODAY'S THEATRES 278
New Design and Installation of Plumbing Do Not Forget Children Are Patrons, Too

Section 2-D—Projection and Sound

RETISCOPE SCREEN ELIMINATES DISTORTION ..... *Paul Dwane Bethel* 284
Development of Special Fiberglas Screen Makes Every Seat "Down Front, Center!"

THE REQUIREMENTS OF PROJECTION LIGHTING ..... *Harry H. Strong* 285
Screen Size Determines the Type of Lamp Providing the Most Pleasing Illumination

PROVIDER OF D.C. CURRENT: THE GENERATOR ..... *H. P. Sherer and E. T. Rummel* 288
Advantages of Motor Generators Set Forth In Relation to Best Projection Lighting

PROVIDER OF D.C. CURRENT: THE RECTIFIER 291
Discussion of the Copper-Oxide Rectifier As a Means of Converting Theatre Current

RECENT DEVELOPMENTS IN PROJECTION OPTICS 293
Orthoscope System and Heat-Filtering Glass Top the New Advances in the Theatre Feld

LENSES IMPROVED BY LOW-REFLECTION FILMS 299
Perfection of Process for Coating Lenses A Great Development in Projection Optics

NOTES ON PROJECTION, PROJECTION EQUIPMENT 304
Survey of Makers' Opinion on What Is Best And What They Offer to Achieve Those Ends

NOTES ON SOUND AND LOUDSPEAKER EQUIPMENT .. 313
Survey of Makers' Opinion on What Is Best And What They Offer to Achieve Those Ends

SUGGESTIONS ON PLANNING PROJECTION ROOMS 326
A Cursory Review of Basic Specifications For the Most Efficiently Operated Booths

Section 2-E—Heating, Ventilating, and Air Conditioning

DRAFTS WILL HURT THE BOX-OFFICE RECEIPTS ..... *T. W. Reynolds* 372
The Cause of Drafts and Their Elimination Through Use of Air Diffusers Is Explained

RADIANT HEATING BECOMES MODERN THEATRES ... 375
Raising the Temperature of the Cold Walls Proposed as Alternate to Heating the Air

MAINTENANCE OF AIR-CONDITIONING EQUIPMENT .. 379
Brief Summary of the Things to Be Done To Keep Machinery in Good Running Order

Section 2-F—Supply Dealers

THE SUPPLY DEALERS OF THE UNITED STATES 394
Comprehensive Listing of Names, Addresses, Personnel, Products, and the Areas Served

SUPPLY DEALERS OF THE DOMINION OF CANADA 403
Comprehensive Listing of Names, Addresses, Personnel, Products, and the Areas Served

SUPPLY DEALERS OF THE REST OF THE WORLD 404
Comprehensive Listing of Names, Addresses, Personnel, Products, and the Areas Served

MANAGEMENT

Section 3-A—Services

SERVICE COMPANIES IN EFFICIENT MANAGEMENT ... 420
Regular Attention by Those With Know-How Valuable for Maintaining Top Performance

Section 3-B—Advertising

MODERN THEATRE: SETTING FOR SHOWMANSHIP ..... *Melvin L. Gold* 430
The Specialty Accessories Now Available Emphasize Points-of-Contact Advertising

UNUSUAL USES FOR THE USUAL ACCESSORIES ..... *Vincent Trotta* 433
Interesting Variations Will Be Obtained By Combination of Several Standard Items

ROLE OF OUT-SIZE DISPLAYS IN ADVERTISING ..... *Melvin Starr* 435
Big Pictures, Long Runs Require Signwork Especially Designed for Big-Time Selling

OUTDOOR ADVERTISING AS EXPLOITATION AID ..... *C. D. McCormick* 440
Advantages of 24-Sheet Posting Outlined As a Medium of Advertising New Pictures

Section 3-C—Business Practices

AN INSURANCE PROGRAM FOR THEATRE OWNERS ..... *Henry Anderson* 444
A Consideration of the Types of Coverage For Full Protection of Physical Property

FORMS AND SYSTEMS IN EFFICIENT MANAGEMENT ... 446
How to Keep the Necessary Theatre Records To Insure Proper, Business-Like Operation

Section 3-D—Miscellaneous Types of Operation

UNUSED ROOF SPACE TURNED INTO PROFIT AREA ... 460
Creation of a Roof Garden Utilizes Space For Developing Good Will — and Profits

THE THEATRE HOME FOR THE THEATRE OWNER..... 461
Bringing Home and Business Under One Roof Establishes New Design for Modern Living
BRIEF CONSIDERATION OF TRANS-LUX THEATRES... 468
Advantages of the Rear-Projection Cinema Are Listed; Critical Equipment Described
DRIVE-IN THEATRES AND THEIR CONSTRUCTION ..... *W. W. Smith* 471
Pros and Cons of the Outdoor Auto Theatre Summarizing Principles of Their Planning
NOTES ON EQUIPMENT FOR DRIVE-IN THEATRES..... 477
Individual Loudspeakers Main Deviation From Apparatus Used in Enclosed Cinemas
A BRIEF CONSIDERATION OF 16-MM. THEATRES..... 483
Potentialities of 1945-1946 Equipment Sufficient to Service 400-Seat Cinemas

Section 3-E—Public Health

ULTRAVIOLET AIR STERILIZATION IN THEATRES.... 486
Summary of the Basic Findings of Science; Notes on Use of Certain Commercial Units
AIR DISINFECTION FOR THEATRE AUDITORIUMS ..... *John J. Perkins* 491
Post-War Application of Hygeaire System Termed Practical Air-Sanitizing Method
PATRON PROTECTION WITH ULTRAVIOLET LIGHT ..... *A. R. Dennington* 495
Air-Duct Installation of Germicidal Tubes Described for Sanitizing Air in Theatres
MANAGEMENT CAN BEAT ITS INSECT PROBLEM ..... *Dr. Harold H. Shepard* 498
Last Word in Insecticidal Ways and Means Are Set Forth by Noted Cornell Scientist
THEATRE FIRE TRAGEDIES ARE PREVENTABLE ..... *Robert S. Moulton* 505
Suggestions Given on How to Prevent Fires And to Train Personnel for Any Emergency
REFRESHER ON THE PRINCIPLES OF FIRST AID..... 509
What-to-Do and When-to-Do-It Are Reviewed For Application in Unforeseen Emergencies

Section 3-F—Revenue Boosters

POPCORN AS AN ADJUNCT TO THEATRE OPERATION.. 522
A Brief Review of the Selling of Popcorn As the Latest Revenue Booster for the Cinema
FOR SALE: FROZEN FOODS IN THEATRE LOBBIES.... 526
Vending Machines for Packaged Groceries Seen as New Management Service to Patrons

Section 3-G—Personnel Training

A TRAINING COURSE FOR THEATRE PERSONNEL ..... *David M. Baltimore* 536
Home-Study for Would-Be Theatre Managers Covers Operation, Advertising, Projection
LEARNING WHILE WORKING KEEPS STAFF ALERT ..... *Tony Peluso* 539
Theatres Can Promote Efficient Operation By Instruction at Regular Staff Meetings
THE DUTIES OF PERSONNEL IN CASE OF FIRE ..... *Safety Research Institute* 540
Organization and Responsibility of Staff Is Essential for Meeting All Emergencies

TELEVISION

Section 4-A—Television

TELEVISION: A COMING AMUSEMENT INDUSTRY ..... *J. R. Poppele* 544
Video Art Will Have a Niche All Its Own And Operate Successfully in Its Sphere
THE EFFECT OF TELEVISION ON THE THEATRE ..... *Ralph B. Austrian* 545
His Possession of a Box Office Will Make The Exhibitor Television's Fair-Haired Boy
MOTION PICTURES AS AN ALLY OF TELEVISION ..... *Paul Raibourn* 549
The Two Arts Are Held to Be Complementary And Not Antagonistic Entertainment Fields
HISTORY OF THEATRE TELEVISION IN BRITAIN ..... *Capt. A. G. D. West* 552
Past Experience and Future Developments Give Factual Data to American Exhibitors
"WHY" OF TELEVISION IN ONE-SYLLABLE WORDS ..... *James Frank, Jr.* 563
Facts Every Theatre Operator Should Know To Understand Why Television Is Possible
AMERICAN THEATREMEN CONSIDER TELEVISION.... 569
Potential Theatre Use and Value of Video Are Considered in a Survey of Executives

INDEXES

COMPLETE SUBJECT INDEX TO THIS 1945 EDITION.... 573
CUMULATIVE INDEX TO THE PREVIOUS EDITIONS.... 579
THE 1945 INDEX TO ALL ADVERTISED PRODUCTS..... 581

Contributing Author and Architect Listing

A

ABRAMS, LEO F. 26
ANDERSON, HENRY 444
AUSTRIAN, RALPH B. 545

B

BALTIMORE, DAVID M. 536
BASIL, MARY (Mrs. Constantine J.) .. 461
BENSON, J. LELAND 141
BETHEL, PAUL DWANE 284
BROWN, WATER T. xii
BUDINA, A. O. (Consultant) 60

C

CADDLE, BERTRAM B. 140
CANTIN A. MACKENZIE (with ALEXANDER A. CANTIN) ...20, 22, 24
CANTIN, ALEXANDER A., and A. MACKENZIE CANTIN 20, 22, 24
CHURCHILL, B. F., AND SON 18
COLVIN, RAY G. xi
CORGAN, JACK 90, 101
CRANDALL, BARRETT L. 152

D

DEANGELIS, MICHAEL, J. 14, 96, 102, 104
DENNINGTON, A. R. 495
DEVRY, WILLIAM C. 129
DOUGLAS, WILMOT C. 54
DRAPER, DOROTHY 208

E

EBERSON, DREW 2
EBERSON, DREW (with JOHN EBERSON) 28, 30, 56
EBERSON, JOHN, and DREW EBERSON 28, 30, 56

F

F AND Y BUILDING SERVICE ..76, 78, 80, 82, 84, 86, 88
FOGLER, IRVING C. 226
FRANK, JAMES, JR. 563

G

GOLD, MELVIN L. 430
GONSER, DR. BRUCE W. 131
GRANT, L. B. 144

H

HUGHES, IALMGE C. 68

J

JOHNSTON, ERIC A. xvii

K

KAPLAN AND SPRACHMAN 34
KIVETT, CLARENCE and RALPH E. MYERS 36

L

LARKE, RUSSELL GOODWIN 38, 40
LEE, S. CHARLES 93
LEE, WILLIAM H. 42, 44
LESCAZE, WILLIAM 66
LITTLE, ROBERT A. (with G. HOLMES PERKINS) 50
LONG, FREDERICK R. 150
LORRAINE, E. C. 182
LUBLIN, MCGAUGHY, AND ASSOCIATES .. 12
LUKE AND LITTLE 46

M

MACKASEK, EDWARD 174
MAHARAM, JOSEPH 209
MAYER, ARTHUR L. xiii
MCCORMICK, C. D. 440
MOORE, VERNON A. (A. O. BUDINA, Consultant) 60
MOULTON, ROBERT S. 505
MYERS, RALPH E. (with CLARENCE KIVETT) 36

N

NEWKIRK, JANET 147

P

PELUSO, TONY 539
PERKINS, G. HOLMES, and ROBERT A. LITTLE 50
PERKINS, JOHN J. 491
POPPELE, J. R. 544

Q

QUINN, HAYES 109

R

RAIBOURN, PAUL 549
RANEY, VINCENT G. 16, 32, 48, 52, 58, 62, 64
REISMAN, PHIL xvi
REYNOLDS, T. W. 372
RICHARDSON, J. CORNELL 216
RUMMEL, E. T. (with H. P. SHERER) .. 288

S

SAFETY RESEARCH INSTITUTE 540
SERRANO, FRANCISCO JOSE 168
SHARP, HOWARD 218
SHEPARD, DR. HAROLD H. 498
SHERER, H. P., and E. T. RUMMEL 288
SIZEMORE, RAYMOND 70
SMALLEY, DAVE E. 184
SMITH, ALLEN G. x
SMITH, W. W. 471
SOBOTKA, PROF. WALTER 157
STARR, MELVIN 435
STEBBINS, J. D. 166
STRONG, HARRY H. 285
SULLIVAN, ARTHUR G. 232

T

TECHNICAL COMMITTEE (of the Institute of Carpet Manufacturers of America, Inc.) 221, 224
THALHEIMER AND WEITZ 72, 74
TOMPKINS, C. E. 229
TROTTA, VINCENT 433

W

WAGNER, ERWIN 177
WARNER, JACK L. xiv
WEST, CAPT. A. G. D. 552
WRIGHT, FRANK LLOYD 9

Y

YASSENOFF, LEO 128

Equipment and Dealer Advertiser Listing

A

Abbott Theatre Equipment Company 395
Adam, Frank, Electric Company 268
Adler Silhouette Letter Company 188, 189
Advance Research Corporation 360
Allen Billmyre Company 411
Altec Lansing Corporation 363
Altec Service Corporation 425
American Mat Corporation 202
American Seating Company 264
American Sterilizer Company 518
American Theatre Supply 401
Amusement Supply Company, Inc. .. 399
Anemostat Corporation of America 390, 391
Automatic Devices Company 271

B

Ballam, Thomas F. 414
Ballantyne Company, The 343
Bausch and Lomb Optical Company .. 357
Berlo Vending Company 528
Best Devices Company 368
Bigelow-Sanford Carpet Company ... 258
Black Light Products 248
Blue Seal Cine Devices, Inc. 340
Blumberg Brothers, Inc. 401
Boston Water Purifier Company 519
Breuer Electric Manufacturing Company 412
Brient, Elmer H., and Sons Theatre Equipment 395

C

Capitol Theatre Supply Company ... 396
Century Protector Corporation 341
Chicago Theatre Supply Company .. 395
Cifre, Joe, Inc. 397
Cine Supply Company 398
Clancy, J. R., Inc. 273
Columbus Show Case Company, The 533

D

Davison Enamel Products, Inc. 193
Dazian's, Inc. 238
Delta Theatre Supply 396
DeVry Corporation 338, 339
Dominion Sound Equipments, Ltd... 403
Draper, Dorothy, Inc. 249
Dunbar and Company 532

E

Emanuel, Jay, Publications, Inc. 453, 454, 455, 456, 572
Essannay Electric Manufacturing Company 364
Exhibitor, The, see Jay Emanuel Publications, Inc.
Exhibitor Bookshop, The, see Jay Emanuel Publications, Inc.

F

F and Y Building Service 172
Falls City Theatre Equipment Company 396
Filbert, John P., Company 394
Forbes, "Ernie," Theatre Supply.... 397
Forest Manufacturing Corporation .. 350
Formica Insulation Company, The.. 205
Fort-A-Cide Corporation 516, 517

G

General Aircraft Equipment, Inc. ... 199
General Detroit Corporation 520
General Electric Company 352, 410
Goldberg Brothers 415
Golde Manufacturing Company 369
Goodall Fabrics, Inc. 239
Goodall-Sanford, Inc. 239
Governair Corporation 386

H

Hertner Electric Company, The 353
Hewes-Gotham Company 370
Hornstein, Joe, Inc. 395, 399

I

Ideal Seating Company 265
Inter-Mountain Theatre Supply Company 402
International Alliance of Theatrical Stage Employees and Moving Picture Machine Operators of the United States and Canada 427
International Projector Corporation 331, 333

J

Jackson, O. W., and Company, Inc. .. 203
Johnson Fare Box Company 201

K

Kliegl Brothers 274, 275
Kneisley Electric Company, The 354
Kollmorgen Optical Corporation ... 358
Kroehler Manufacturing Company .. 266

L

LaFrance Industries 240
LaVezzi Machine Works 365
Lawrence, Malcolm 400
Lorraine Rubber Engineering Company 204

M

Maharam Fabric Corporation 241
Manley, Inc. 529
Marsh Wall Products, Inc. 206
Massachusetts Theatre Equipment Company 397
McAuley, J. E., Manufacturing Company 351
Mid-West Theatre Supply Company, Inc. 400
Mohawk Carpet Mills, Inc. 254, 255
Monarch Theatre Supply, Inc. 401
Motiograph 342
Mueller Brass Company 392

N

National Carbon Company 367
National-Simplex-Bludworth, Inc., see National Theatre Supply
National Super Service Company, Inc. 413
National Theatre Supply ..192, 196, 199 256, 257, 330, 331, 332, 333, 348, 349, 351, 352, 353, 362, 384, 385, 386, 394, 395, 396, 397, 398, 399, 400, 401, 402
New York Brass and Wire Works Company 197
Novelty Scenic Studios, Inc. 244, 245, 246, 247

P

Paramount Decorating Company 250
Penn Theatre Equipment Company .. 401
Perey Turnstile Company, The 200
Poblocki, Ben. B., and Sons Company 194
Poppers Boy Products Company 527
Projection Optics Company, Inc. 359
Projection Products Company 366

R

Radiant Manufacturing Corporation 361
Radio Corporation of America ..267, 334, 335, 336, 337, 355, 395, 396, 397, 398, 399, 400, 401, 402
Rambusch 263
RCA Service Company, Inc. 426
Reliance Art Metal Company, The .. 195
Reversible Collar Company 542
Riseman, William, Associates 251
Robin, J. E., Inc. 356
Ross Federal Research Corporation 428
Ross International Corporation ... 428

S

S. O. S. Cinema Supply Corporation .. 416
Schumacher, F., and Company 242
Smith, Alexander, and Sons Carpet Company 252, 253
Star Manufacturing Company, The .. 530
Strong Electric Corporation, The 346, 347
Sturtevant, B. F., Company 389

T

Textileather Corporation 236, 237
Theatre Catalog, see Jay Emanuel Publications, Inc.
Thortel Fireproof Fabrics 243
Trio Amusement Company 401
Typhoon Air Conditioning Company, Inc. 387

U

Union Carbide and Carbon Corporation 367
United States Air Conditioning Corporation .. 388
Universal Electric Stage Lighting Company, Inc. 274, 275
Universal Corporation 196

V

Vallen, Inc. 272
Vendo Company, The 534
Viking Popcorn Machines, Inc. 531
Voigt Company 259, 260, 261, 262
Vonnegut Hardware Company 276

W

Wagner Sign Service, Inc. 190, 191
Ward Leonard Electric Company 269
Weaver Manufacturing Company 417
Weber Machine Corporation 344
Weiss, I., and Sons 198
Wenzel Projector Company 345
Western Electric Export Corporation 418
Western Sound Equipment Company 402
Westinghouse Electric Corporation 389, 408, 409
Wurdack, William, Electric Manufacturing Company 270

THE WAR YEARS—*and* POST-WAR FORECASTS

A BRIEF CONSIDERATION OF THE YEARS OF WAR AS THEY HAVE AFFECTED THE AMERICAN THEATRE, WITH SHORT SYMPOSIUM BY INDUSTRY LEADERS ON WHAT SHOULD BE THE COURSE OF THE MOTION PICTURE AND INDUSTRY IN THE YEARS OF PEACE

1945

Government and Equipment Industry in War

War Production Board Case History Tells How an Industry well Served Its Country

By ALLEN G. SMITH

Shortly after the attack on Pearl Harbor on December 7, 1941, we were officially at war with Japan.

Prior to that attack, most of our heavy industry was partially converted to the production of materiel for delivery to friendly foreign nations doing business with this country under the terms of the Lend-Lease Act, and other arrangements or agreements.

That attack made it necessary for the War Production Board in Washington to take immediate steps to convert the remaining productive resources of industry so that the needed war materiel could be made available as quickly as possible to our Armed Forces and our Allies.

Our manufacturers were asked to consult with the Ordnance Department of the United States Army and the Department of Special Devices of the Bureau of Aeronautics of the United States Navy, to assist them in the development of different types of synthetic training devices through the use of the standard types of equipment that each manufactured.

A limited quantity of precision instruments was being manufactured in the plants operated by the Army and Navy, but the need for precision equipment and instruments at that time was so great that the Army and Navy required additional plant capacities for the added production.

Our manufacturers had long been recognized as America's foremost producers of precision parts and assemblies. The Army and Navy recognized these especially developed production techniques, and the manufacturers were given contracts on a continuing basis for many kinds of precision instruments used in modern warfare. These instruments included secret sub-assemblies for our perfected bombsights, underwater warfare instruments, supersonic echo-depth finders, true-bearing direction finders, and many types of radar apparatus. They likewise were called upon to manufacture different kinds of aircraft sub-assemblies, including those needed for aircraft engines and gunnery equipment.

In addition to military requirements for these items, the Armed Forces needed large quantities of our standard types of projection and sound equipment for the showing of films prepared for visual training in the maneuvers of modern warfare, as well as thorough training in the use of various types of gunnery equipment. The Medical Corps used the equipment for the showing of films especially prepared in the techniques of first-aid and advanced surgery. The morale and entertainment problems were readily solved when the equipment was used for the showing of films for entertainment purposes.

It was, therefore, necessary for the War Production Board to set aside a portion of our plant facilities for the production of the standard types of projection and sound equipment needed by our Armed Forces. The motion-picture-theatre industry, through the War Activities Committee and theatre-equipment section of the War Production Board, had firmly established itself with the various war agencies in Washington as being vitally necessary to our national economy, and to the successful prosecution of the war. If the motion-picture theatres in the United States were to continue such cooperation, it was then necessary for plans to be made to insure the continued operation of all theatres.

In the early stage of the war, the production of projection and sound equipment and repair parts for civilian theatres was prohibited by certain War Production Board conservation orders. If the Armed Forces were to receive punctual delivery of the various types of projection and sound equipment they needed, and if the civilian theatres were to be supplied with limited quantities of equipment for urgent replacements, and repair parts for proper maintenance, it would be necessary for the jurisdiction over this total production to be placed in one industry operating divison.

The Armed Forces and the War Production Board deemed it desirable and necessary that a limitation order be prepared and issued as an instrument for such control, and Limitation Order L-325 was subsequently issued. The provisions of this order made it possible for the production of the equipment needed by the Armed forces to be scheduled sufficiently far in advance so that deliveries could be made punctually and completely.

The requirements committees of the War Production Board considered the quantities of the various types of equipment needed for urgent replacements in civilian theatres and determined the quantities which could be made for such uses without interfering with the manufacture of any kinds of equipment needed by the Armed Forces.

It is a matter of public record that, because of the cooperation established between the motion-picture industry and the War Production Board, the manufacturers and the supply dealers, not a single theatre in the United States was forced to close its doors because of the lack of repair parts or, in emergency circumstances, complete new booth equipment.

The supply dealer particularly proved to be the cornerstone for the continued operation of all of our theatres. Generally, he carried enough repair parts or accessories to take care of emergency repairs. If a theatre owner's equipment could not be economically nor practicably repaired, the supply dealer made new equipment available after the War Production Board approved his application for permission to sell the needed equipment.

In some instances, new equipment may not have been readily available, and in such cases the dealer supplied loan equipment from his own emergency stock.

The manufacturers of equipment now face the tremendous task of producing enough new equipment to meet a pent-up demand of four years. It is true that during the war years some equipment was manufactured to make urgent replacements, but the total production of all classes of equipment during the four years of war was less than 50 per cent of that which was produced in 1941 alone.

We now need something like 18,000 projectors and a comparable quantity of sound systems, arc lamps, rectifiers, and motor generator sets to make replacements, and for installation in a large number of new theatre projects. We also need a sizeable quantity of all classes of equipment for export because our manufacturers must protect the foreign markets which they developed before the war. Our manufacturers can produce more equipment now than before the war, because they have acquired new techniques in mass production through their experiences in mass production of

For 30 years, Allen G. Smith has been associated with the theatre-equipment business, first with the Southern Equipment Company, in Dallas, Texas, and later with the National Theatre Supply. Early in the war, Mr. Smith was appointed an industrial specialist to the War Production Board, subsequently becoming chief of the agency's theatre-equipment section. In July, 1945, his war work over, he left the WPB, returning to his former post as special representative of the NTS and of the subsidiaries of General Precision Equipment Corporation.

previous instruments used by the Armed Forces.

Currently, and for several months to come, these manufacturers cannot gear their plants to full production because they depend largely upon other manufacturers to supply ball-bearings, fractional horsepower motors, electronic parts, indicating meters, switches, etc., which must be made in large quantities and to minute specifications. Our manufacturers must wait until the facilities of those other suppliers can be reconverted to the manufacture of those needed components. We also use many types of precision castings which must be obtained in large quantities from specialized foundries previously engaged in making castings used in the production of military goods.

When we consider a production cycle of from 3 to 10 months for our different classes of equipment, it is not expected that our manufacturers will start delivery on all of the different classes of equipment, in quantity, for at least nine months. When we give serious thought to these circumstances, we must not relax in our efforts to keep in proper repair all of the equipment which is now in use.

Theatre owners should now seek the assistance and cooperation of their supply dealers so that a new evaluation can be made of their future projection equipment requirements. The supply dealer was most helpful during the war years, and theatre owners need his friendly cooperation and expert advice now more than ever. Theatre owners should plan now to install, when available, such emergency equipment as a complete third projector unit, dual amplification, and emergency device for current conversion. If such installations had been made before the war, the demand for so much new equipment would not now be so great. Such installations are excellent investments and are good insurance against any kind of equipment failures. It reduces the basic causes of dangerous and costly film fires.

Everyone in our business who manufactured, distributed, and serviced projection and sound equipment did a tremendous job in helping to keep all of our theatres in operation during the war years. We are likewise confident that all manufacturers and distributors will continue to be helpful to their customers and considerate of their equipment requirements until they are in full production and can deliver all of the equipment which will be needed.

Theatre Supply Dealers in the War Years

The Equipment Dealers Did Their Share To Keep All America's Theatres Running

By RAY G. COLVIN

As I look back over the past three years in the theatre-equipment business, my first thought can be expressed in one word, "tough," for very little major equipment was obtainable, the small supplies scarce, governmental restrictions creating a vast amount of detail work, no help, only a few exhibitors on Film Row and no gas to go to them. Yes, "tough" seems to be the word. But after a little more thought, I wonder if it was so tough after all, because, as I look over the list of theatre-equipment dealers in this country, I find them all still in business and going strong—no failures, no long faces, no talk of depression, but there is talk. Yes, talk of expansion seems to be the watchword.

Naturally there are reasons why the equipment dealer is in this frame of mind after four years of tough going.

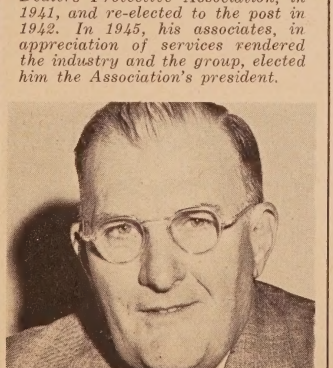
I feel that the manner in which our Government handled the distribution of materials played a big part in assisting the theatre-equipment dealer. In talking to a group of dealers and manufacturers about two years ago, I said in part, "So often when the electrician goes in the government service he comes out a carpenter and when the carpenter gives his services to the government he comes out an electrician, but in the selection of Allen G. Smith, who served as chief of the amusement division of the War Production Board, our government placed the right man in the right place.

Mr. Smith was and is a practical theatre-equipment engineer. He knew all the angles, he knew what the dealer needed to keep the theatres of this country open, and he certainly did a tremendous job. His services are greatly appreciated by the entire group of dealers, and his great effort is one of the reasons why the industry in general is in very good shape.

Not one situation has been brought to my attention where a theatre owner was forced to close his theatre for the lack of equipment or supplies, and that is, indeed, a good record for any industry under such trying times.

The average theatre-equipment dealer has learned a lot from his experiences during the war period. He has learned that he can add new lines to his business, items which in pre-war days were considered almost foreign to the theatre-equipment business. He has learned the value of a good repair shop and service department and also that it pays to give more attention to the small items sold over the counter. He has learned that it has paid to have remained a good salesman, with an interest in his customers' wants, instead of the too-long-looked-at, bored expressions of salespeople and the ever-ready crack of "don't you know there's a war on." Public opinion will express itself on this very attitude, and loud, for quite some time to come. He has learned that projection and sound units are only other items in his store. For, after three years of being without these things, he has found the value to his business of other items of importance which in pre-war days had very little attention, such as carpets, draperies, air conditioning, lighting, rentals, fire-fighting equipment, and even such small items as flashlights and batteries.

A life-long associate of theatre business, the equipment part of the career of Ray G. Colvin really started in 1929 with the establishment of the Exhibitors Supply Company, in Saint Louis. Taking an active part in the equipment-dealers' business, as a national industry, Mr. Colvin was elected secretary of the Theatre Equipment Dealers Protective Association, in 1941, and re-elected to the post in 1942. In 1945, his associates, in appreciation of services rendered the industry and the group, elected him the Association's president.



The dealers' work in the post-war days is now cut out for him. When I look through the trade journals and read of the millions of dollars to be spent on theatre construction and remodeling, I am amazed, and my amazement mounts when I see that this program is all for 1946. I wonder where all this equipment is coming from in one year's time and feel certain that it is not coming that quickly, but some pretty tough boys who thought along those lines wound up behind the eight ball.

A recent survey shows that something like 27 per cent of all projectors now in use are to be replaced and about 30 per cent of the same will be rebuilt. Sound units seem to be in better condition as, it is estimated, 11 per cent of those in use will be replaced. About 20 per cent of all projection lamps will be replaced, as

will be 21 per cent of all generators and rectifiers. Thirty per cent of all theatres say they need new screens, 37 per cent say that new seats must be obtained, and 61 per cent say carpet must be replaced.

Now, add to the above the demand for equipment in foreign countries, and I feel that it can be understood why I say, "It is not all coming in one year's time." But it is coming, and perhaps quicker than we think—when our manufacturers hit their stride. Remember those planes, ships, etc.!

I feel that the dealers owe the exhibitors of the country a big "thank you" for their cooperation and patience during the war years.

It was a case of the exhibitors' marking time with the dealer, the dealers' with the manufacturer, and the manufacturers' with the governmental rulings. In fact, the whole industry is to be praised for the manner in which they met and adjusted themselves to wartime conditions. While I have always been proud of the industry in which I have been a part for many years, my pride today is far greater than ever in show business.

Yes, I am proud of show business for the great part it has played in the war effort, for its educational value, its tremendous aid to morale, both military and civilian, and for its works of charity. Yes, I am proud of show business.

The Whole Industry in the War Effort

A Review of the War Activities Committee In Its Coordinating an Industry's Effort

By WALTER T. BROWN

The motion-picture industry saw the storm of war coming toward the United States long before most of the country realized the German aggression was more than a local upset.

In April, 1940, a group of Army officers asked the producers of Hollywood to make a few films to help out with recruiting, since Selective Service was in danger of being abandoned. These men in uniform were so impressive in their description of the danger that faced the world that Hollywood saw a greater need for its aid.

Sidney R. Kent, a producer who has since died, called a meeting of film people for the Union League Club of New York. Representatives of production, distribution, newsreels, theatres, and other allied branches of the industry were invited. The meeting was on June 5, 1940. France was then reeling, and Britain's only army, its equipment abandoned on the sands of Belgium, had straggled back from Dunkirk, and Hitler's Luftwaffe was smashing English cities. In the United States, it was generally thought that the Nazis would invade England and that the King and his government would flee to Canada. Few people bothered to speculate on what Hitler could do to the defenseless United States. Many were afraid to contemplate what would happen.

Mr. Kent's meeting produced the Motion Picture Committee Cooperating for National Defense. George J. Schaefer became president. Arthur L. Mayer, former Paramount executive and owner of New York's Rialto Theatre, became the treasurer and Simon H. Fabian, of the Fabian chain of theatres, became chairman of the theatres group. These were all volunteer workers. Francis S. Harmon, taken from the New York office of the Motion Picture Producers and Distributors of America, Inc., where he had been executive assistant to that organization's president, was made vice-chairman and coordinator, and a full-time, paid employe.

Many ways were found to help the government in its effort to make the country aware of the danger from the Axis and to arm it to meet that danger. Foreign managers of the producers and distributors and newsreels furnished valuable information to the War and State Departments as to the progress of the totalitarian plots in Asia and Europe.

It was a dark, dark picture. There seemed little likelihood that the advancement of Japan, Germany, and Italy would be stopped unless the United States stopped them. The American army was still using Ford trucks to represent tanks and water pipe and tripods to simulate machine guns.

Then came Pearl Harbor. Remember? It was a cool, crisp Sunday afternoon in most of the Atlantic seaboard states. Many people were listening to the New York Giants-Washington Redskins professional football game. It was December 7, 1941. A fidgety voice broke into the game broadcast to say that the White House had heard that the Japanese had bombed Hawaii. We were in the war, kicked in the backdoor by the little sons of the Mikado. The Japanese had had the gall and the daring to hit the base nearest the American coast.

On December 8, the War Activities Committee of the Motion Picture Industry was born out of the Motion Picture Committee Cooperating for National Defense. Since then, it has been the one funnel through which the industry poured its generous and important assistance to the national war effort. All branches, factions, groups, and cliques of the business buried their grievances, their business antagonisms, their jealousies, and their prides and worked together to help win the war.

It is not "terrific" nor "colossal" language to claim that no other industry has a more enviable record, and it escapes my attention just now if there is another that can equal it.

The industry has actually given away $200,000,000—or maybe $300,000,000—of its wealth in doing what Uncle Sam wanted. How come? Well, the producers made available all their Hollywood productions for showing to troops overseas. Whatever the Army wanted was made into 16-mm. films and contributed. Seventy thousand of these films—half entertainment features and half short subjects—were distributed. More than 1,000 entertainment features were picked. This gift film contribution in raw stock, processing, and at 5 cents a copyright cost a person, represented more than $40,000,000.

Through July 6, 1945, the 16,000-odd theatres held 30,661 free movie days, 23,913 regular and children's bond premieres during six of the seven war bond campaigns. Admission to these shows was by bond. The theatre got no money, the distributor no rental. There could conceivably be $100,000,000 contribution in this. Films were made for the use of the Office of War Information, hundreds of technicians and executives gave their time to government work, and paying their own expenses. Stars of the screen

As its director of publicity and associate coordinator, the War Activities Committee of the Motion Picture Industry chose Walter T. Brown. Prior to service in the Army—from which he was discharged as a captain following wounds received in the Sicily campaign—Mr. Brown was chief of the Albany bureau of the Associated Press (1928-1936) and secretary (1936-1942) to the former governor of New York, Herbert H. Lehman. His early training in journalism and politics has stood him in good stead in serving the motion-picture industry.

made tours and individual appearances on all war drives. They went overseas to entertain. They visited hospitals and camps here. Trade papers gave away space and paid for advertisements, and accessory concerns, like National Screen Service Corporation, gave material and time to the War Activities Committee and to the war.

Everybody in the whole motion-picture business can be proud of what the industry did in the war. It was a front-rank, civilian soldier in the national effort that brought success. It need not be reiterated that thousands of men and women were called to the colors. Seven thousand, or one-third of Hollywood, went to war. A percentage of them died in battle just as a percentage of barbers, bankers and bartenders.

There is a job ahead for the barbers, bankers, bartenders, and other ex-service men and for the civilian fighters, like the motion-picture industry—the preservation of the peace that was so dearly bought. The screen is the newest and most comprehensive town meeting. With the radio and the press, the screen has the responsibility to keep the peoples of the world informed on world events.

United We Stand, in Peace as in the War

Eloquent Plea Is Voiced for Preserving Gains of Industry's Wartime Cooperation

By ARTHUR L. MAYER

Recently I visited India, a vast and potentially powerful nation, and it reminded me greatly of the motion-picture industry. In spite of its huge resources and possibilities for human service, it has been consistently pushed around and treated as an inferior and an outcast. Why? Because, like the motion-picture industry, it did not have sense enough to get together and use its strength.

"What we really need is to exploit our unity," said an Indian taxicab driver to his young lady passenger. "If every Indian were to spit once we could drown the British."

The motion-picture industry also requires unity, although it does not need indulge in such unsavory salivary practices to obtain it. During the war we made vast progress. Through the War Activities Committee, for the first time in the history of the industry, all the discordant elements of our discordant business found solid ground on which they could function effectively and harmoniously. We discovered that individual hostilities and grievances could be overlooked in a common effort for an uncommon cause. Through our independent, self-regulating divisions—exhibitors, distributors, Hollywood, trade papers, and the rest—every branch of the industry, without sacrificing a fragment of its own sovereignty or its own right to independent action, had the opportunity to make itself heard and felt and to perform the job for which it was best adapted.

In every town in the United States, our theatres became community centers as well as commercial enterprises. We enriched and deepened our contacts with the outstanding members of every community—bankers, congressmen, legislators, business men. In every city of 10,000 or more population, our public relations division had a local representative constantly in touch with press and radio. Mimeographed publicity stories emanating from New York and Hollywood receive uncertain attention when sent directly to the nation's 1,800 newspapers, but our local public-relations men had direct personal contact which proved invaluable in placing releases of interest and concern to the public.

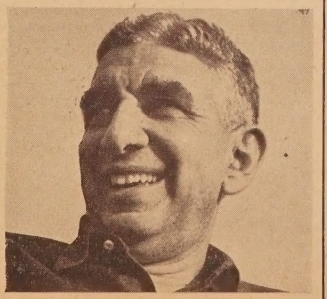
In the 31 exchange areas, for the first time, we had committees of exhibitors, distributors, and publicity men working together instead of against each other. Every film salesman of every company was a part of this exchange area organization. Through this set-up it was possible, within 24 hours, to get in direct touch with virtually every theatre in the country. Only those in the field who have seen first hand the effectiveness of the War Activities Committee machinery in our various drives, can fully appreciate the value of such an organization. To this widespread organization of exhibitors, the power of the Motion Picture Producers Association and of the craft and talent guilds of Hollywood were harnessed for industry-wide nation-serving purposes.

Now it is solemnly proposed to junk this invaluable organization like so much old film. If we do so, we will, in the not too distant future, I predict, have to seek to reconstruct something of a similar nature and to reconstruct it without the cohesive pressure of war and patriotism, and without the stimulus of our nation's peril. Let us make no mistake: the problems of peace will be as arduous and complicated as those of war. No industry, least of all one as vulnerable to attack and misinterpretation as ours, can afford to face these problems a house divided against itself. No industry, without grave danger to its future usefulness, can afford to be left at the post in the post-war world.

Within our ranks there are, and I assume always will be, internecine strife between distributors and exhibitors, between affiliated circuits, unaffiliated and independent theatre owners, between major and minor producers, and between both of them and the Hollywood guilds. But above and beyond these inevitable internal problems, there will, in the post-war world, be issues at stake affecting the welfare of every man and woman in the industry—issues on which we as members of the picture family, inevitably see and feel alike whether we are producers, distributors or exhibitors. Issues on which, if we are wise, we will act alike.

We have many organizations: the "Hays" association, exhibitors' organizations, and talent and craft guilds. I am not suggesting for one moment that any of them be scrapped. But when we get into a fight, the resources, manpower, and experience of all of them must be concentrated in a solid phalanx of defense. And we are in for such a scrap. The bigots, the reactionaries, the isolationists, the anti-Semites are more virulent, more vicious, more widespread than ever. The horrors of war did not extract but only enhanced their venom. The need for national unity failed to make a dent on the hard epidermis of their enmity. Throughout the war they sought to deprecate our contribution to the national effort, the patriotism of our leaders, and services of our fighting sons. Anyone who listened to them would have thought that we had instigated the sneak attack on Pearl Harbor and that we were responsible for the Nazi and Nippon policies of race hatred and bestiality, which even in defeat still endanger all mankind. These enemies of humanity regard the freedom of the

As managing director of New York's Rialto Theatre, Arthur Loeb Mayer has achieved nation-wide notice, but in spite of his "House of Horrors," this Alabama-born, Harvard-educated exhibitor has developed a highly sane view on the whole industry. He has served as film consultant to the Secretary of War and to the National Red Cross, for which he has made trips to the Pacific Ocean Area, the European Theatre of Operations, and (presently) China. He also served the War Activities Committee at one time as treasurer and assistant coordinator.



screen as a cardinal point for attack. They await only a suitable opportunity to renew their assault upon us.

The problems of censorship, government film production and distribution, disposition of surplus property of war agencies, taxation, television, labor demands, 16-mm. pictures, and newspaper relationship confront us as an industry and not as producers or exhibitors, affiliated theatres or independents. The federal government is unlikely to terminate its requests for our aid and we are in a far better position to sift the wheat from the chaff through an experienced central clearing agency than if individuals are subjected to direct pressure and personal appeals. The American Red Cross, the Infantile Paralysis Foundation, and national charities of their character and widespread appeal will expect continued cooperation from us. Less worthy appeals will need to be turned aside promptly. Otherwise, enthusiastic individuals will quickly involve all of us in quasi-commitments of an embarrassing nature.

Some leaders of independent exhibitor organizations oppose retaining the machinery of War Activities because they fear that in some unspecified manner a national association will hamper the operation or limit the importance of their groups. There is, however, no intention to trespass in any fashion on the acrimonious field of internal relations within the industry. In the battle between distributors and exhibitors, independents and affiliated, labor and capital, a national organization would play no part. It would only seek to speak for the industry on the issues where their interests are similar and where, to exercise the most influence, we must act as a unit and not as a group of warring factions.

On the other hand, some producing and distributing executives are reputed to hesitate because of the expense involved in the maintenance of a national organization. This sudden conversion to economy in motion picture's high places would be amusing if it were not so tragic. The budget of War Activities for 1944 and 1945 was $180,000, and regular operating expenses were kept within that figure. Let us assume that a national organization might cost us even $250,000 annually. More money than that, is wasted weekly in Hollywood on scenes which get no further than the cutting room floor. "Millions for waste footage but not one nickel for defense" is scarcely a slogan worthy of a great industry.

The War Activities Committee was by no means faultless. It was organized in haste to meet an emergency and its original leaders were self-appointed. A genuine effort was made to represent all branches of the industry but at no time were the various committees geographically well-balanced or their membership ever properly selected by the rank and file of the men and women whom they sought to represent. The heads of a new organization should be selected by democratic procedure. Affiliated industries—such as laboratories, equipment manufacturers, film carriers and fan magazines—should be included in the association. But these are only minor problems. The fundamental one that confronts our industry today is unity—not internal unity which means the paralysis of progress—but unity to defend our common interests and to seek the fullest freedom for the motion-picture screen as the outstanding expression of American entertainment and American ideals.

Production Aims for the Post-War Years

A Noted Producer Outlines the Principles Of Movie-Making for Tomorrow's Theatres

By JACK L. WARNER

If you asked me to summarize what types of pictures the motion-picture industry as a whole should make for post-war showing, I would say, first of all, that every producer in the industry should be free to make whatever type of picture he thinks ought to be made. Beyond that I would say that our industry must provide the film-going public with a satisfactory balance between pictures which deal seriously with the major issues of the day and pictures which are pure entertainment.

We want pictures which stand for the ideal of freedom and human decency as it is practiced in this country and in the other free countries of the world. We do not want pictures which preach undemocratic idealogies or other doctrines inconsistent with our free traditions.

In the field of straight entertainment, we must keep our standards high and our pictures clean.

In a recent talk I listed these six points that I think American motion pictures will have to carry to the people of the world after the war: (1) Every one of us is responsible for safeguarding our great American heritage; (2) every one of us must remember that freedom, if taken for granted, can be lost; (3) we must be quick to recognize the forces that will destroy freedom; (4) we must be physically able to put down those forces if they attack us; (5) we must be morally able to keep them from developing within our own country; and (6) we must never forget that the world cannot exist half-slave and half-free.

In the post-war, world motion pictures must have the same freedom of expression as is guaranteed to the press and spoken word. We must be constantly on the alert to resist all forms of dictation or attempted regulation. We must refuse to be intimidated from expressing our honest convictions on the screen. As Anthony Eden pointed out, we were fighting not just to win a fight but to win a world in which our children and their children can know the security of peace and freedom. That struggle may go on for ten years after the war.

When I say that the American motion picture must not be intimidated, I mean that it must carry on with the full conviction of its sacred right to say what it thinks. It need not and must not apologize for having something to say. We can expect that any pictures which deal with the current problems of the day will be attacked. We do not have to worry about the attacks of people who simply disagree with the picture. That is healthy and in the best American tradition. What we must defend ourselves against are the attacks of a certain group of people who believe that this is a country of 12,000,000 people instead of 130,000,000, and who would like to limit free discussions accordingly.

Any really good picture has meaning and purpose, and it should have, and the people who make the picture should be proud of the fact, not ashamed of it.

Now that the war is over, the American motion-picture industry is going to run into something it never had to face before. It is going to have to compete in a world which, during the war, has become film-conscious.

The American motion picture has for years been the most powerful ambassador of good will and the most effective salesman that this country has ever had. It has spread throughout the world the reputation of this country for freedom, opportunity, and a high standard of living. It has made the United States a model nation in the eyes of millions all over the world, and despite a handful of gangster pictures which caused a lot of comment, the majority of American pictures have made friends for us all over the world. We have done this great job of international good will just on pure merit and without any encouragement or help from our government. Neither the government nor the public has ever had an adequate appreciation of what American films have done for America — but they may have a rude awakening ahead of them. I hope that while the governments of other countries are quietly setting about to subsidize and sponsor film industries of their own our government will not put into effect policies which will cause this country to lose its great motion-picture advantage and which may put us back on a level with the struggling film industries of other countries.

The war has brought about a great development in picture making in many countries. England, for example, has become very much film-conscious. They want to make British pictures and to show British pictures here and everywhere else, as well as in Britain, which they are entitled to do if they compete on a quality basis with the rest of the world's motion picture industry. Before the war, France was turning out good pictures and the Germans kept the French motion-picture industry going all through the years of their occupation. South American countries, and Argentina in particular, have been cultivating their own film industries. So has Mexico, as you all know. These governments will teach their people to want their own pictures and they will not be satisfied with a dubbed version of something that was made purely for the American market. Not only that, they may set up all sorts of quota restrictions. They may even try to keep our pictures out. Some countries which make only a few pictures will buy ours only on the basis that we take one of theirs for every one of ours they buy. You can imagine what that will mean. The alternative may be that we will be forced out of foreign markets, and if we do not export our pictures, this country will lose all the benefit that has come to it from the world-wide showing of American motion pictures. That is something for our State Department to think about.

It is also something for our writers to think about. Pictures with a foreign background will have to be authentic in every detail. They will have to capture the idiom of the country. These other countries will no longer be willing to accept an American version of an Englishman, Frenchman, or Russian. People in other countries will want to see their own modes and customs accurately portrayed. The picture will have to ring the bell in the country in which it is shown or it just will not get in. That means that screen writers will have to know their material and their backgrounds a lot better than ever before. It means the same thing for directors and producers. It means that if we are to have any foreign markets at all, we are going to have to turn out pictures that will have meaning in other countries as well as in the United States. These pictures will have to be produced in such form that they will be acceptable to other countries as well as ours. They will have to reflect the problems of the people of other countries as well as our own.

After the war we know that the whole world will be much smaller and nations will be much closer together. Up to now, we have been making pictures which have been acceptable in all of our own 48 states. After the war, we will have to make pictures that will be welcomed in nearly as many nations.

American screen writers will have to be aware of new developments in screen writing all over the world. They will have to compete with new techniques that have been developed and that will be developed in other countries. We are moving into a period of more and more advanced techniques in screen writing and motion picture making. Hundreds of men and women, not only in foreign countries, but right here in our own country as well, have had to learn how to make good pictures for lower costs. In countries like England, where there have been shortages, they have had to learn how to make pictures with a minimum of film, sets, actors, and equipment. Necessity is a great teacher and we may have a lot to learn from them. Many people who left civilian life as clerks will come back as motion-picture technicians and good ones, too. The competition will be keen, and the writer, director, or producer—or anyone else—who can not keep up with the pace will simply be left behind.

We might as well face the facts. The motion picture is passing into a new stage of its evolution.

First there was the nickelodeon phase, then came the movies, then the talking motion picture. And now we are moving into the phase where the motion picture is becoming an international medium of expression.

We are entering an era in which we will not be the only ones to write the rules and regulations. The formulas for picture making will grow out of the needs of all nations of the world. And we will have to satisfy them or give up our leadership to others.

There is a very serious danger that in the struggle for world markets, countries may employ protective devices that will restrict freedom of expression. I hope that will not happen because that is the way back to the conditions that led to this war. If there is one single thing that we have learned from this war it is that a free world must have free and unobstructed communications. We in this country must have full freedom to know what is really going on in the other countries of the world, and they are entitled to the truth about us.

This is something which must be written into the peace treaty. Had the world paid heed to the reports of American newspaper and radio correspondents and to the thousands of newsreel films and German propaganda films that pictured the growing Nazi might during the years that led to Munich, you can be sure that Hitler would never have gotten as far as he did.

Some of us did our best to point this out, but unfortunately we were outnumbered by people who were unwilling to recognize the facts when shown to them.

We in motion pictures have a great responsibility to the people of this world. Our children born and those as yet unborn will rely on us to record for them the pictorial truth about our times. Only by seeing and hearing the truth will they cherish what has been handed down to them and will they understand the price that was paid for their liberty. We cannot let it be said of us that, in the greatest crisis of civilization, motion pictures did not deal realistically with events as they happened.

For this reason, we of motion pictures must insist that the motion picture be represented at the peace table. We must be represented to assure our cameras free access to the truth in all nations of the world. We must be represented so that we may record on film the actual scenes of the peace conference. There must be a motion-picture record made for the future. We cannot agree to the barring of motion-picture cameras any more than we could consent to the exclusion of the press and radio. Now that the motion picture has a voice, it is without question the greatest of all mediums for recording the great events of history. This fact has had important and official recognition during the war. There has been made a great motion-picture record of this war. Some of the pictures were made here in Hollywood, but most of them have been made on battlefields all over the world, on land, on sea, and in the air. And they have been made by members of our own industry both in civilian clothes and in uniform.

As our men return from war, they will have a new concept of the value of motion pictures. That goes not only for the men who have been behind the war cameras, but for the great armies of men who have made up the battlefront motion picture audiences. They know what the motion picture can do and they will expect and demand great things of it. They will not tolerate the misuse of this great medium for unworthy purposes. They will insist upon seeing pictures they can respect, and the whole future of the motion picture industry depends on how well we satisfy that demand.

We can take the easy road and be lazy and complacent. If we do, the great world of tomorrow will pass us by and we will find ourselves outmoded and displaced by some new medium of entertainment and enlightenment. But if we are all on our toes and alive to all the opportunities of the future and aware of the great potentialities of the motion picture, then there is no limit to what motion pictures may be able to do for civilization.

Above all, let all of us in the motion-picture industry remember what a great force for good we have in our hands. Let us be sure that we will use it well.

As vice-president and executive producer of Warner Brothers Pictures, Inc., Canada-born Jack Leonard Warner has been an ardent advocate of "selling" the United States through the medium of better motion pictures. Indeed, so pronounced have been the company's efforts along this line that the New York Times once declared that it had made "an enviable record for combining good citizenship with good picture making." As a lieutenant colonel in the Army Air Forces, he supervised the making of many training shorts, as well as subjects for other government agencies.

American-Made Movies in Foreign Markets

Production Faces Bright, Prosperous Year Despite the War-Damaged European Markets

By PHIL REISMAN

The appraisal of what the future holds for Hollywood films in foreign markets should go hand in hand, in my opinion, with the extent of American prestige in international circles. Because, if peoples of other countries appreciate our ways of life, our institutions, and what they represent, as depicted in our pictures, they will continue to demand Hollywood product on their local screens for as long as American prestige holds out. From personal observation in travels around the world, I feel confident that the demand for Hollywood screen entertainment, based on production, story, and star values, will continue unabated for many years to come.

This demand varies, of course, according to the economic conditions and national requirements of each country. In isolated cases, where antagonistic influences tend to resist the unimpeded distribution of Hollywood screen entertainment, the will of the people is openly flaunted. I believe careful study should be given the causes of such attitudes and, insofar as it may be possible for Hollywood to do so, a remedy should be found. When the remedy, however, lies beyond the industry's reach, help of the various duly organized industry agencies, properly backed by the State Department, should be enlisted to bring about a happy solution.

CONTINENTAL EUROPE

Territorially speaking, continental Europe today is Hollywood's sore spot, as compared to other parts of the world. This condition will probably continue to remain until its economic life progresses sufficiently to allow the rebuilding of war-torn industries and production outlets. How long this condition will continue and how extensive the rebuilding should be, before the general situation improves sufficiently is more than I can say, but the situation, to say the least, requires all-around expert handling and plenty of quick action.

UNITED KINGDOM

There is a definite effort on the part of United Kingdom's motion-picture executives to work in close cooperation with the American industry. As an outstanding example of this helpful attitude, mention may be made of the joint production deal now in operation between J. Arthur Rank and RKO Radio Pictures, Inc. Both Charles Koerner and myself are extremely happy, and grateful as well, for the cheerful treatment and close cooperation shown us during our recent trip to London by Mr. Rank, his associates, and subordinates in considering the various production and distribution matters. As Mr. Koerner has declared to the trade press, forward steps were taken for the production of "So Well Remembered," the first of the two pictures to be jointly produced.

Public interest in American-made pictures continues high in the United Kingdom. Good pictures bring in outstanding business. Plain out-and-out entertainment and escapist pictures figure prominently in hold-overs and, after the horrible nightmare that ended in complete victory, British fans are looking for music, fun, and gaiety in their screen entertainment. And whoever is giving them what they want is getting the business on a fair-and-square basis.

FRANCE

In Paris, our negotiations with Pathe Cinema were brought a step closer in a series of conferences with Managing Director Adrien Remauge, which resulted in an agreement simultaneously to produce jointly, on a bilingual basis, both French and English versions at the Joinville studio. This agreement will mark a new era in French-American cooperation, and it may serve as a pattern for future efforts, if it turns out as successfully as all the interested parties expect it to be.

AUSTRALASIA

Down Australasia-way, the demand for American-made pictures continues strong. During the war, almost every picture hung up a new box-office record. However, interest in war pictures—at least, those where instruments of death are seen at their deadliest best—has waned almost to the vanishing point. The people will patronize pictures indirectly connected with the war, but dramatic and romantic values must be acceptable, while action pictures, murder mysteries, and high-class musicals are sure bets throughout the land.

As the vice-president in charge of foreign distribution for RKO Radio Pictures, Inc., Phil Reisman has traveled all over the world, and especially through the countries of Latin America. During the war, he served as an associate director of the Office of the Coordinator of Latin-American Affairs, handling the distribution of 16-mm. propaganda films. He also served the War Activities Committee as chairman of the foreign managers division, seeing to it that the Armed Services were regularly supplied with entertainment films.

THE FAR EAST

The Far Eastern markets, to my mind, present greater opportunities for expansion than any other continent. Theatre building must accompany—or, rather, precede—this growth. Sixteen-millimeter films and equipment will play a leading role in the hinterland, as pathmakers for standard-size films. With the growth of national communications in China, for instance, the possibilities for American-made films assume staggering proportions.

There is also Japan, another market bound to bring us in the future greater returns than heretofore. Reports from all quarters, to the effect that American-made pictures have a strong hold on Japanese audiences, help to strengthen the belief that, as soon as official restrictions are removed and distribution activities return to civilian status, the American companies will be kept very busy, even though there might be a considerable reduction in the combined total of features allowed for Japanese consumption under U. S. Army rule.

Dutch East Indies, Philippine Islands, Malay, and Indo-China are countries where American-made pictures stood high in the favor of native audiences before the war. With a pent-up demand, brought about by enforced abstinence during the years the invader held sway, the markets are ready to distribute it.

These countries are also a natural outlet for distribution and exhibition of 16-mm. educational and entertainment films and equipment.

With the restoration of international trade, transportation, and so forth, the building of a large number of new theatres can be expected to give added impetus to the successful distribution of American-made films in these thickly populated regions.

LATIN AMERICA

In the Latin American countries there has been a steady increase in the number of theatres, which augurs well for the future of American-made pictures and an even greater number is slated for construction as soon as equipment becomes available. A plethora of local capital seems to be waiting for investment in new motion-picture houses all the way from Mexico down to Buenos Aires and

Santiago. In Brazil, the only Portuguese-speaking South American nation, public interest in Hollywood films, like the growth of the country itself, is on the upgrade, and it looks as though greater returns per capita can be expected in the future for American screen entertainment.

SOUTH AFRICA

A certain amount of growth, as far as popular interest in American-made films is concerned, has also been noted in South Africa. The percentage of growth is going to be greater, I believe, once the market on 16-mm. films and projectors is broadened sufficiently to create the motion-picture habit in thousands of additional fans. Their potential needs are unsatisfied, and their inherent desires to see motion pictures will be met either through the building of new theatres or by bringing to their settlements, wherever distances are too great, portable 16-mm. projection equipment and films for open-air exhibitions.

CONCLUSION

Barring a few relatively unimportant spots, I believe Hollywood may look with confidence to a bright and prosperous year of international trade in 1946. Unless the Angel of Peace folds its wings in a dive for bomb-proof shelter—a most unlikely happening according to present signs—American-made films, the purveyor of hope and happiness to the masses of the world, will overcome all obstacles in fair and open competition for global entertainment.

The Goal of Post-War Film Distribution

A Vital Role Is Played in Entertainment Diffusing American Ideas to Whole World

By ERIC A. JOHNSTON

In the larger sense, the goal of distribution in the motion-picture industry must be, I submit, to insure a constant flow of entertainment, information, and education to the theatres in our own land, and to maintain through our films a broad highway of communication with other countries throughout the world. It is a man-size job. That the American picture industry is able to do this upon a level of distribution which makes economically available the best films that our studios can produce not only to the "picture palaces" in our great urban centers but, eventually, to the smallest crossroads theatre is no mean achievement.

Film distribution in the domestic market alone is directed to some 17,000 theatres scattered over 48 states, requiring thousands of skilled and experienced workers in 431 film exchanges strategically located in 31 key cities. One must marvel at the precision of this intricately organized and technical operation which rarely fails to produce the scheduled film at the right time for the show to go on as planned in every theatre.

The challenging goal for tomorrow is to do all this on a basis where every responsible element in the industry can meet on a common platform of service.

This industry is not unique in its competitive problems. The balance springs that regulate the processes of production, distribution, and consumption, if industry and labor are to fulfill their promise of prosperity, always need care and often need readjustment. Such readjustment can only be the result of industry thought and planning, of conciliation and arbitration.

Every industry today must soberly face its responsibilities in a world which yearns for peace and plenty. But the screen, it seems to me, has a peculiar responsibility. We are the custodians of the greatest technique of telling a story ever devised by man. What we express through this medium is of the greatest importance to our own country and to the world. The distribution of entertainment to the millions of men, women and children who look to the screen for recreation, and often for inspiration, is a function of vastly greater significance than distribution of goods and services in most other fields.

Each week something like 80,000,000 people in our country go to the motion-picture theatre for wholesome entertainment. They are entitled to the finest programs which can be projected on the screen. Through the fact of our artistry, our pictures have found a place on the screens of other lands. We must see to it that abroad the American design of living is truly reflected and not distorted.

For all these reasons, it is clear that, as an industry, we must not forget the value of united cooperative effort which the war so well taught us. All elements of the industry—producer, distributor, exhibitor, representatives of the actors', directors', and writers' guilds and the crafts—have worked together for common victory. They must continue to work together for common progress.

Enlightened self-discipline is and will continue to be the surest guarantee against government censorship and regulation. The industry, by trial and error, has learned that decent, clean, and truthful entertainment is most surely and permanently successful. The lesson has been learned. It is the job of all of us to see that it is not forgotten.

The debt of an industry like ours for its tremendous growth and for warm acceptance by the American people is too obvious to mention. It must be repaid in the steady unclipped coin of responsible and enlightened leadership. Such leadership must even be willing to sacrifice short-range advantages for long-range benefits to the public and thus to itself.

The substance of any lasting system is the hope of an ever-rising standard of living in the future, accompanied by convincing evidence of accomplishment as we move along. We can and must provide better food, better clothing, better housing, and education for all our people. With our know-how and tremendous natural resources, we can do this.

We may as well face the fact that there are other political and economic systems in the world, wholly different from ours, but which do have mass appeal especially in time of industrial strife and stagnation. The only way to prove our system is better is to make it work better. The next five years may tell the tale. Now is the time to pull off our coats and get at it.

This is the sort of job that all of us working together in the motion-picture industry can do—a down-to-earth sort of job providing an unprecedented opportunity to serve a united, democratic, and prosperous country.

Eric A. Johnston, as president of the Chamber of Commerce of the United States, achieved wide recognition as an effective spokesman for American business. The soundness of his views on the present and future role of business in the development of the United States are acknowledged at home and abroad and greatly influenced his selection as successor to Will H. Hays as president of the now-named Motion Picture Association of America, Inc. In World War I, he was a Marine, and was, in 1921, discharged with the rank of captain.

The "E" Record of Equipment Manufacturers

Cinema-Allied Industries Win 375 Awards, Comprising 107 Flags and 268 More Stars

War workers in 4,283 of the nation's top-flight war production facilities earned the Army-Navy "E" Award for their part in the defeat of the Axis powers. This number includes the Navy "E" Awards made prior to July, 1942, when the Navy "E," the Army "A," and the Army-Navy Munitions Board "Star" Awards were merged and became known as the Army-Navy "E" Award.

Representing only about 5 per cent of the estimated war plants in the nation, those plants meeting the stringent eligibility requirements ranged in size from a one-man plant to large corporations and included facilities which converted from peace to war production, as well as new plants built especially for war purposes.

The Army-Navy "E" Award was granted only to facilities which were particularly outstanding in production for the War and Navy Departments. Excellence in quality and quantity of production were two of the determining factors in granting awards. Others included (a) the overcoming of production obstacles, (b) low rate of absenteeism, (c) avoidance of work stoppages, (d) maintenance of fair labor standards, (e) training of additional labor forces, (f) effective management, (g) record on accidents, health, sanitation, and plant protection, (h) utilization of sub-contracting facilities, (i) conservation of critical and strategic materials. Plants which maintained an outstanding record of performance for six months after receiving the original Army-Navy "E" Award were granted a Star Award, indicated by a white star on their original "E" flag. Additional stars would be won by continuing outstanding performance for succeeding six-month periods until the flag carried four stars, after which the interval was increased to one year.

Of the 4,283 plants that were granted the "E" Award, eight had won six Star Awards when the program was ended. Of the remaining Awards, 763 had been granted one Star Award; 723, two Star Awards; 776, three Star Awards; 820, four Star Awards; and 206, five Star Awards.

The final Awards were granted at the August (1945) meetings of the Army and Navy Boards for Production Awards and both Boards have been subsequently dissolved.

Plants which won the Award are at liberty to continue flying the Army-Navy "E" Award flag, and to make use of the Award insignia in their publicity and advertising, while their employes, entitled to receive the Army-Navy "E" Award pins, may continue to wear them.

The following list includes all the plants normally manufacturing motion-picture equipment, or material utilized by theatres, that won the Army-Navy "E" Award for outstanding war production, but it does not include plants whose Awards were withdrawn or canceled. The figure at the right is the number of renewal Stars received by the companies.

The motion-picture industry may well be proud of its manufacturers.

THE ROLL OF HONOR

Company	Number of Stars
Allis-Chalmers Manufacturing Company, West Allis Works	4
American Blower Corporation, Russell Plant	5
American Optical Company (includes Brattleboro plant)	4
——Scientific Instrument Division	3
American Seating Company	1
Amperex Electronic Corporation	3
Ampro Corporation	
Argus, Inc., Optical Division Plant No. 2 (Includes Plant No. 1)	4
Artkraft Sign Company, Plant No. 1	
Automatic Electric Manufacturing Company	1
Bausch and Lomb Optical Company	5
Belden Manufacturing Company, Chicago Plant	1
Benwood Linze Company and B-L Electric Manufacturing Company	
Bigelow-Sanford Carpet Company, Inc., Amsterdam Plant	2
David Bogen Company, Inc.	
Bowser, Inc.	4
Bright Star Battery Company	
Bryant Electric Company, Wire Device Division	3
Buffalo Forge Company	4
Burgess Battery Company, U. S. Battery Division	2
Carrier Corporation	5
Century Electric Company, Main Plant	1
Cine Simplex Corporation	4
Clarage Fan Company	1
Clarostat Manufacturing Company, Inc.	3
Corning Glass Works	4
Crane Company, Chicago Works	4
Cutler-Hammer, Inc., Twelfth Street Plant	4
DeVry Corporation, Main Plant	4
——Plant No. 2	4
DuMont, Allen B., Laboratories, Inc.	2
DuPont deNemours, E. I., and Company, Inc., Fairfield Plant	1
——Nylon Research Laboratory and Pilot Plant	4
Eastman Kodak Company, Camera Works	4
Electric Storage Battery Company, 19th St. and Crescentville Plants	5
Electronic Corporation of America	
Fairbanks, Morse and Company, Freeport Works	4
Farnsworth Television and Radio Corporation, Fort Wayne Plant	1
Federal Electric Company, Inc.	2
Firestone Rubber and Latex Products Company	2
General Aniline and Film Corporation, Ansco Division	2
General Detroit Corporation, Jefferson Avenue Plant	
General Electric Company, Bridgeport Works	4
——Schenectady Plant	2
General Luminescent Corporation	
General Motors Corporation, Frigidaire Division	4
Goodrich, B. F., Company, Akron Plant	1
Goodyear Tire and Rubber Company, Plant No. 3	
Handy, Jam, Organization, Inc.	4
Hertner Electric Company	
Heywood-Wakefield Company	4
Holmes Projector Company	1
Howell Company	
Ilex Optical Company	3
Ilg Electric Ventilating Company	4
Keasbey and Mattison Company, Plants 1, 2, 4, 5, and 8	3
Kimberley-Clark Corporation, Ordnance Division	2
Kollmorgen Optical Corporation	4
Littlefuse, Inc.	1
Magnavox Company	5
Mallory, P. R., and Company, Inc.	4
Johns-Manville Corporation, Manville Plant	3
Masland, C. H. and Sons	4
Micro Switch Corporation	3
Minneapolis-Honeywell Regulator Company, South Minneapolis Plant	4
Mohawk Carpet Mills, Inc.	3
Motiograph	1
National Carbon Company, Inc., Niagara Works (includes National, Atcheson and Republic Plants)	4
——Edgewater Works	1
National Gypsum Company, Niles, Ohio, Plant	
Nelson, Herman, Corporation	3
Owens-Corning Fiberglas Corporation, Newark Plant	4
——Huntingdon Plant	
Powers Regulator Company	2
Radio Corporation of America, RCA Victor Division	4
Rauland Corporation, Plants 1, 2, 3, and 4	
Ray-O-Vac Company	3
Raytheon Manufacturing Company, Power Tube Division	3
Reeves Sound Laboratories, Inc.	3
Rockbestos Products Corporation, Plants 1 and 2	3
Roe Manufacturing Company, Belleville Plant	
Sangamo Electric Company	4
Shure Brothers	3
Smith, Alexander and Sons, Carpet Co., Velvet and Axminster Mills	3
Sonotone Corporation, Martlex White Plains Plant	2
South Bend Lathe Works, South Bend Plant	5
Sparks-Withington Company, Plant 1	
Stanley Works, Main Plant	3
Stoner Manufacturing Corporation	3
Stromberg-Carlson Company	4
Sylvania Electric Products, Inc., Boston Street Plant	3
Textileather Corporation, Toledo Dye Works	1
United States Plywood Corporation, New Rochelle Plant	
United States Rubber Company, Mishawaka Plant	3
Universal Corporation	
Vendo Corporation	4
Ward Leonard Electric Company	5
Weber Machine Corporation	
Westinghouse Electric Corporation, East Springfield Works	4
——Lamp Division (includes plants at Trenton and Belleville, New Jersey, and Fairmount, West Virginia)	1
——Lighting Division, Cleveland Works	2
——East Pittsburgh Works	5
Worthington Pump and Machinery Corporation, Worthington Works	4
Wurlitzer, Rudolph, Company, DeKalb Division	2
Yale and Towne Manufacturing Company, Stamford Division	2
York Corporation	1
Zenith Radio Corporation	4

EDITORIAL FOREWORD

If there has been any doubt in the minds of any American as to the contribution of the motion picture industry to the final victory in World War II, they have been dispelled on December 4, 1945, when the government presented to the War Activities Committee a bronze plaque in recognition and appreciation of the services given by the industry during the war years. At the ceremonies in Washington, government leaders joined with military spokesmen in praising the assistance and wholehearted effort of all branches of the business.

It would be difficult, of course, to divide this 100-pound plaque, reading "Well Done, Motion Picture Industry," among the thousands in the industry who had a share in the tremendous effort, but to each one of them —and also to the equipment manufacturers, supply dealers, and associated craftsmen— due credit must be given. For the plea of conservation and watchfulness eventually led to a record which has never been equalled in this business or any other. Thanks to the unselfish and sincere assistance of everyone, no theatre went out of business—and mighty few had to close for any length of time at all—because of mechanical breakdown.

But now that era is passed, and a new one is upon us, one which, at the start, may be as difficult as, or even more troublesome than, the World War II proved. We say this, well knowing that there is a huge backlog of orders for equipment, building, rebuilding, renovation, and so forth, which have come from the majority of the theatres of the nation. True, there will be plenty of work for everyone, but there now exists a transition period in which the same levelheadedness that prevailed during the war years must also be dominant. Given the chance, the equipment manufacturers and supply dealers will handle this onrush of new business with the same sanity they demonstrated when the strain on them was the greatest.

We are about to witness a boom era for many divisions of the business. New theatres will be built and many more existing ones will be eventually rebuilt, and in practically all the others there will be some physical change. It behooves everyone of us to cooperate fully with the men who have to do the job. They, more than anyone else, know the problems of the conversion period, the labor unrest, the rising prices, the value and worth of new materials, and the other developments that, unless handled carefully, would lead to chaos.

And this is why the THEATRE CATALOG makes its reappearance after a cessation of four years. For this Fourth Edition of what has come to be the bible of the physical theatre—for the theatre owner, the architect, building contractor, equipment manufacturer, supply dealer, and other allied firms—is a ready guide to the answer of many post-war problems.

However, the undertaking of this edition has not been attempted without some hesitancy and not a little misgiving as to where and when it would see the light of day. With government restrictions on paper the first great hurdle that was overcome, only to find that paper, in an unrestrained market, still remained a critical problem. Then, too, there was considerable hesitancy on the part of the potential sources of editorial cooperation and advertising support to commit themselves, notwithstanding wartime advances in design, construction, and operation of equipment and the trickling adumbrations of things to come as a result, in peacetime, of these developments.

But the work of preparing the 1945 Edition went on, and, as a result, there is here presented what we honestly believe to be the finest collection of articles ever to appear in an edition of the THEATRE CATALOG. Herein the past, the wartime past, is reviewed by some of the top-ranking men of the various fields in the motion-picture industry, and the story is told of advances in innumerable fields, in each of which a distinguished authority (however, not always mentioned by name, for reasons best known to the authority or author involved) has been chosen for his position in the particular field.

Nor have the aspects of the present been overlooked—those subjects which, like Tennyson's brook, go on and on, more or less unchanged from year to year. And, of course, a modicum of articles have been included on the maintenance of various parts of the physical theatre.

Because such a task would be impossible for a single group to bring to fruition, the THEATRE CATALOG freely admits its indebtedness to American science and industry for being able here to present this material. To the authors—as individuals and as representatives of their various companies, no less also to the societies and organizations which preferred that no individual receive specific credit for the material submitted—the THEATRE CATALOG offers special thanks.

But we would be, indeed, most ungrateful if we did not mention here a few of those

who, by furnishing material and by acting as consultants, have in no small measure made the unsigned material an authoritative presentation of the subject matter involved. Accordingly, we pause at this point to extend our thanks and appreciation to the following persons and companies for their cooperation.

In Section 1—To Hanns R. Teichert, Max C. Hanisch, Jr., and Unit Structures, Inc.; W. S. Ferguson, and the Lincoln Extension Institute, Inc.; William H. Page, the Bureau of Industrial Service, Inc., and the Owens-Corning Fiberglas Corporation; R. H. McCullough and the National Theatres Amusement Company, Inc.; Morris Sanders; Monte Skeggs and the Universal Corporation; O. H. Niendorff and the American Brass Company; R. H. Allewelt, Ralph Baker, E. E. Bang and the Republic Steel Corporation; John Ireland and the Tin Research Institute; Herbert K. Lewis and the Stran-Steel Division of the Great Lakes Steel Corporation; A. R. Trinkle, John W. Sands and the International Nickel Company, Inc.; Stuart J. Swensson and the American Hot Dip Galvanizers Association; H. G. Winecoff, Peter White, H. C. MacDaniel, and the Westinghouse Electric Corporation; Radio Corporation of America; Dr. Colin G. Fink and Columbia University; Colin C. Campbell and the Rohm and Haas Company; W. D. M. Allan, A. J. Boase and the Portland Cement Association; Rafael Ruano; W. H. Graeff and the Resinous Products and Chemical Company; Plaskon Division of Libbey-Owens-Ford Glass Company; Stephen J. Wilson and the Bakelite Corporation; Dennis C. Guthrie and the Eastman Kodak Company (for the Tennessee Eastman Corporation); the Formica Insulation Company; Michael J. Brown, Jr., and the Plastics Division of the Monsanto Chemical Company; R. L. Bailey and the E. I. du Pont de Nemours and Company, Inc.

In Section 2—To Ben Adler and the Adler Silhouette Letter Company; Dave E. Smalley and the Continental Car-Na-Var Corporation; John D. Riddick and the Johns-Manville Corporation; A. D. Pickett and the United States Quarry Tile Company; Leon L. Klaus and the Armstrong Cork Company; William Riseman Associates; L. Barnett, Mary M. Moyle and the Dow Chemical Company; Leon A. Chastel and the Thortel Fireproof Fabrics; Alexander Smith and Sons Carpet Company; Bigelow-Sanford Carpet Company; Lees-Cochrane Company, Inc.; A. and M. Karagheusian, Inc.; Mohawk Carpet Mills, Inc.; L. W. Hutchins and the Safety Research Institute, Inc.; Frank R. Fortune and the Nik-O-Lok Company; E. O. Kollmorgen and the Kollmorgen Optical Corporation; M. Johnson and the H and H Optics; Dr. Milton Harris, Gypsy B. Frankenberg, and the Milton Harris Associates; R. F. L'Hote, B. F. Stall, Richard Barnhart, and the American Radiator and Standard Sanitary Corporation; Warner S. Victor and the Projection Optics Company, Inc.; Albert H. Blum and the Bausch and Lomb Optical Company; Harry H. Strong and the Strong Electric Corporation; Dr. Dean A. Lyon; L. P. Moyer, C. Dudley Foster, Dr. Katherine B. Blodgett, and the General Electric Company; H. B. Anderson, the Ketchum, MacLeod, and Grove, Inc., and the A. M. Byers Company.

In Section 3—To H. M. Bessey and the Altec Service Corporation; Adolph Goodman and the RCA Service Company, Inc.; the Bell and Howell Company; William H. Fries and the William J. Burns International Detective Agency; Ralph Dudley and Pinkerton's National Detective Agency, Inc., Fire Marshal Alexander M. Smith, Police Superintendent Howard P. Sutton, and the Bureau of Public Safety of the City of Philadelphia, Pennsylvania; the entire engineering and commercial staff of the Radio Corporation of America; Park-In Theatres, Inc.; Fred C. Matthews and Motiograph; Gilbert J. Haeussler and the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture; Cornell University; University of Minnesota; W. Graham Cole and the Metropolitan Life Insurance Company; D. P. Caverly and the Sylvania Electric Products, Inc.; the Hanovia Chemical and Manufacturing Company; Sperti, Inc.; Irving Zussman and the National Popcorn Company; Jim Blevins and Blevins Popcorn Company; Viking Popcorn Machines, Inc.; Star Manufacturing Company, Inc.; Dunbar and Company; Gerald T. Lynn and the Refrigeration Equipment Manufacturers Association.

In Section 4—To Bob Davis and the National Broadcasting Company, Inc.; University of Notre Dame; Janet Goosens and the Philharmonic-Symphony Society of New York; Radio City Music Hall; George T. Shupert and the Television Productions, Inc.; Baird Television; Scophony, Ltd.; British Broadcasting Corporation, and Dr. Arthur Levey and Scophony Corporation of America; James M. Brennan RKO Service Corporation; Larry Woodin, Arcadia Theatre Company; Harry Brandt, Brandt Theatres; C. A. Schultz, Commonwealth Theatres, Inc.; Frank L. Newman, Evergreen Theatres Corporation; F. J. Fitzgibbons, Famous Players Canadian Corporation, Ltd.; Guy A. Kenimer, Florida State Theatres, Inc.; E. C. Rhoden, Fox Midwest Amusement Corporation; C. B. Akers, Griffith Theatres; John H. Harris, Harris Amusement Companies; E. M. Loew. E. M. Loew's Theatres; E. V. Richards, Jr., Paramount-Richards Theatres, Inc.; J. Myer Schine, Schine Circuit, Inc.; Truman T. Rembusch, Syndicate Theatres, Inc.; N. A. Taylor, Twinex Century Theatres Corporation, Ltd.; R. B. Wilby-Kincey Service Corporation.

And, for inestimably valuable services rendered in the course of the preparation of the entire volume—To Leonard W. Bidwell and the RCA Victor Division of the Radio Corporation of America; Walter E. Green, A. J. Lindsley and the National Theatre Supply Division of National-Simplex-Bludworth, Inc.; Roger Whitney, and Patricia M. Whitney.

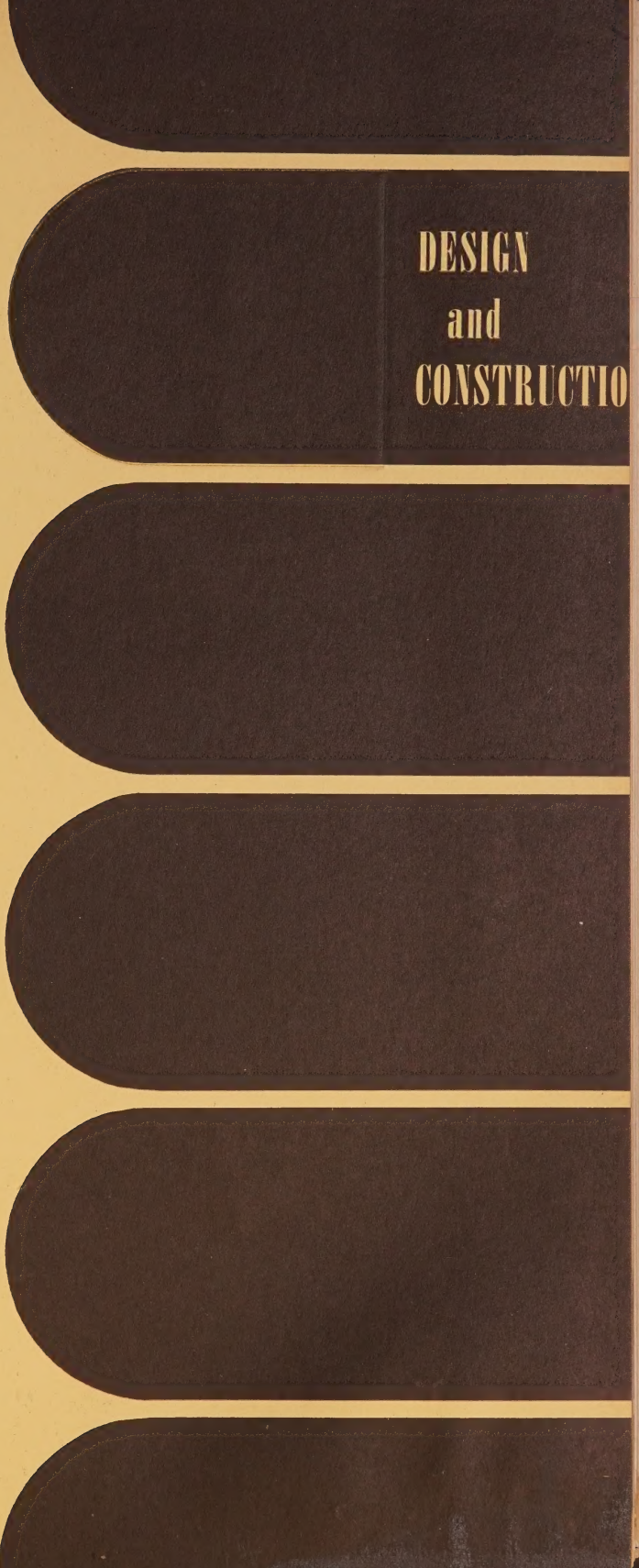
The preparation of this volume has not been easy, but through the cooperation of those already mentioned, and of the scores of other scientists and engineers consulted in the course of the work, the task has been appreciably lightened, and it is with what we hope may be pardonable pride that this 1945 Edition of the THEATRE CATALOG is presented to the theatre industry of the world.

In the years to come the physical theatre will become more and more important in the amusement world, for, while people will yet come to see the screen attractions, it will be the remembered feeling of complete satisfaction that will keep them returning—or the equally well remembered feeling of complete dissatisfaction that will preclude repeat performances.

Accordingly, in this volume an effort has been made not only to chronicle the latest thoughts and ideas in maintaining present properties in their best condition, but also to set forth that which, in the not far distant future, should result in even better theatres.

As this volume has been the product of cooperation and mutual understanding, so in that spirit is it presented, with the realization that, when all the facts are known, no problem is unsurmountable.

THE EDITORS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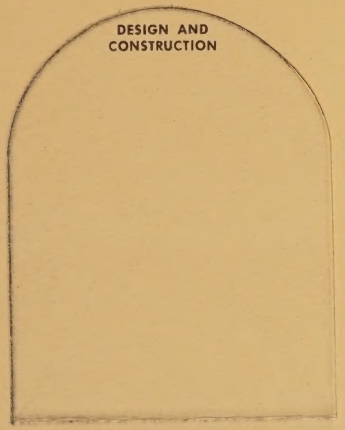


THUMB-DEX
Patent No. 1579575

SECTION 1 - A

NEW DESIGN

1945

Hints on Planning the Community Theatre

First Step in Design Is Study of People Who Might Be Patrons at the New Theatre

By DREW EBERSON
Architect, John and Drew Eberson

It has been my good fortune to have had the opportunity, both before this war and during it, to visit and study theatre patronage in many types of communities throughout this world.

I have studied, firsthand, varied conditions found in the many types of communities in our own country, such as in the steel and textile towns, the sophisticated urban communities, and middle class main streets. I have also been able to study community conditions of the jute mills of Calcutta, the cotton factories of Bombay, the tea plantations of Burma and China, the thriving communities of Sidney, Melbourne and Brisbane, as well as those of Brazil, Egypt, and the Gold Coast of Africa.

Through these studies, I have come to the conclusion, and our office has followed in practice, that theatres must be designed about the people of a particular community, and every community has its own personality, likes and dislikes. The theatre architect must understand this human side of the community before he can properly design a theatre that will fill this important niche in community life. It is an established fact that the theatre in the community is an institution with such importance as the church and the school and in its design and management it must assume this responsibility in reflecting the character of the people who live in the community. A stock theatre design cannot be utilized. The type of theatre that serves the smart suburbs of New York cerainly could not fill the bill in New Delhi, India, where Moslems and Hindus do not drink from the same drinking fountain and do not utilize the same entrance and seating facilities of a theatre. Nor would the practical Australian man and woman from down under, with their pioneer demand for simplicity, appreciate the same type of house that the citizens of a Pennsylvania mill town, whose antecedants came from Continental Europe, would require in their way of life.

PERSONALITY OF THE THEATRE

In the design of a community theatre there must be kept in mind at all times that a personality or atmosphere is being created and that the theatre will be judged in the community, not necessarily by the detail or little tricks employed in making it attractive, but rather in the overall atmosphere that is resultant from these combinations of details. Many patrons, when interviewed, will say that they just like a certain theatre—they can not explain why—they have no particular reason, but they just feel at home and like its atmosphere.

We have many examples of community theatres that do not have modern facilities, have not been kept up to date, that do not even have the requisites of good sound, sight lines, and sanitary conditions, but they have become a part of the community and people will patronize them in spite of their defects.

So, in creating a new theatre for the community, the architect must be careful not to create an edifice that is simply a fad and a stranger—he must study the tastes of the people who are to enjoy this theatre, let his own tastes interpret the character of the people of the neighborhood, and then transform that personality into brick, mortar and steel.

FITTING THE THEATRE to the community has been admirably accomplished by Thomas Lamb in his design for the Community Theatre, Toms River, New Jersey. A fishing port and coastwise harbor, even before its conversion into a summer resort, the town is surrounded with a wealth of historical lore, the spirit of which the architect caught in the neo-Colonial design of the theatre. Set back from the usual sidewalk-flush building line, the cinema is the more striking because of the absence of marquee and signwork normally deemed essential.

THE YOUTH ANGLE

With such a large percentage of the movie-going public being children or 'teenagers, impressions gained by young people in their community theatre are lasting ones. One must be careful not to awe people with the grandeur of a theatre, which was a policy followed many years ago in the days when we were building gold and gilt palaces. In those days a man paid for the privilege of bringing his family to what, in his mind, might be termed "the palace of the kings." Those days are gone. People like to feel that the community theatre i their theatre.

A great problem of theatre management today is the vandalism of the youth in destruction of seats, sidewalls, etc. It has been my experience that in a properly designed theatre the youth of the community can be persuaded to have pride in their theatre rather than resentment of its grandness or of its cheapness, and through this medium of theatre-going, develop a greater respect for community property and the property of others.

DETAILS OF DESIGN

Sign

To outline, briefly, the details of design, we should start, naturally, with the sign. In strictly neighborhood communi-

ties, it is not necessary to have a loud, flashy sign, as though you were attracting patrons off the streets of Broadway. It is much more desirable and proper to have a sign and displays that are adequate to announce to the public the attractions that are being offered but not, to use a slang phrase, "to hit them over the head with it" not to be too conspicuous, but to be lively and interesting.

Entrance

The entrance must be inviting, and the placement of the box office accessible, but not necessarily immediately on the property line, as is required in downtown locations. The patrons have generally made up their minds before attending the picture, so it is not necessary to "drag them in off the streets."

Retiring Rooms

The matter of retiring rooms is most important. The average modest home has modest sanitary conveniences. Our community theatre must have the very best—sparkling, tile-lined toilet rooms and chromium-plated, multi-colored fittings—tasteful ladies' powder rooms—practical men's smoking rooms.

Auditorium

The auditorium, of course, must be friendly and warm, and although the greater part of the time the theatre is used for straight pictures it is desirable to have a sufficiently large platform in front of the screen so that the auditorium can then be used for presenting high school bands and small acts, that do not require flying of scenery, or as a meeting place for the political problems of the community. Lighting must be so arranged that house lights may be brought up for such occasions.

Parking Space

Of course, parking spaces are of vital importance and are practically a necessity in the community theatre planning.

CONCLUSION

I wish to emphasize once again that it is my conviction that the people of the community dictate the design of the community theatre. If the people are conservative, the design of the structure and the accoutrements should follow this in detail. If the people are of the character which requires color, gaiety, and appeal, then give them brilliant and flashy theatres. The word "showmanship" has been much abused in theatre design and management. Showmanship is not necessarily blatant and horn-tooting—it may be subtle and in quiet taste and still be great showmanship. It is impossible for an architect to sit in his office and design a theatre for a particular community without having first-hand knowledge of the people this theatre is to serve. A properly managed theatre is the focal point of the life of the community and can fail miserably if it is contrary in character to that of its patrons. Let us have more custom designed theatres. Let us study our people rather than follow the wild, modern designs of the theorists.

A TYPICAL EXAMPLE of a theatre designed to meet the character and personality of the community is the Playhouse, Ridgefield, Connecticut. For years the townsfolk had desired a modern motion-picture theatre, but it was not until Irwin Wheeler, of Casey and Wheeler, commissioned the firm of John and Drew Eberson to draw plans for the Playhouse that the desire became realized. The Messrs. Eberson stuck fast to a true colonial design, and, in adapting the theatre to the community, the owners have reaped great benefit. The various points to be considered in such an adapting process are set forth in this article.

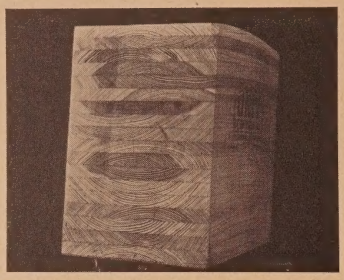
Wood as a Theatre Construction Material

Laminated Arches, Plywood Panels Presage Coming of All-Wood Pre-Fabricated Cinemas

There has been much speculation on the use of modern structural and decorative building material as soon as war restrictions are removed and the fruits of intensive development are made available in all their variety and quantity. Many of these products are known by their trade names, but not as widely as they should be, while their composition and application to specific purposes remain in a kind of hopeful state of suspended public optimism, much as is created by a good magician's act. Countless articles are undeniably going to come out of the hat all right, but what will happen after that?

So vague is much of the public knowledge about these developments of the nation's best research in this field that the impression is arising that many of these products are practical do-alls for all related needs. On the contrary, each product is scientifically created for a certain purpose and has had characteristics engineered into it for supremacy within that purpose.

It is to enlarge theatre management's knowledge of which of these materials are applicable to their needs, and in what degree, that this article is presented.



CROSS-SECTION VIEW of a glued laminated structural section. This piece was cut from the end of the section, as fabricated by Unit Structures, Inc.

GLUED LAMINATED WOOD

The building material to be examined is glued laminated wood in some of its forms most adaptable to theatre needs. While this material is not new, having been in successful use for more than thirty-five years, some of the modern applications of its use are now being widely scrutinized. To this end, two men were carefully selected for their highly specialized points of view. The first is M. C. Hanisch, Jr., one of the founders of Unit Structures, Inc., of Peshtigo, Wisconsin, an outstanding company in this field which pioneered all glued laminated wood construction in the United States. And the second is Hanns R. Teichert, head of the Chicago studios of the same name, one of the largest theatre decorating firms in the country. These two eminently qualified specialists dovetail their views, so as to present a whole picture of what qualities and advantages certain types of glued laminated wood have to offer theatre management.

In the first place, let us define what is meant by glued laminated wood. Mr. Hanisch explains that it is the process of forcibly gluing, under high pressure, various layers of wood of predetermined moisture content into solid units, using structural glues of high water resistance to form a solid bond without the use of any mechanical fasteners. Pound for pound, the result has greater strength than steel, a fact recognized and taken advantage of by the aircraft industry.

THE LAMINATED ARCH

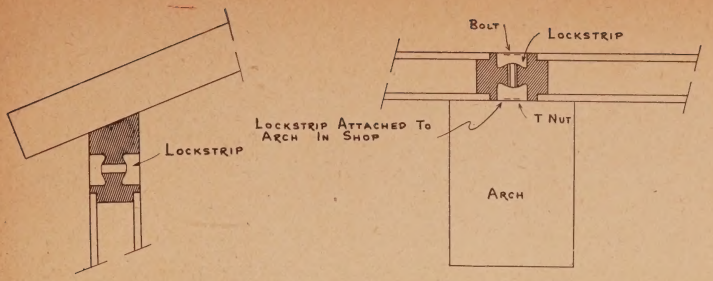
A glued laminated arch spanning a building generally begins at the foundation and consists of two rigid half sections which are bolted or hinged at the crown. Therefore, roof support and column are a unit, which provides decidedly greater stability than is afforded through separate trusses and supporting columns artificially connected. An answer to greater safety, especially in the matter of resisting shock from earthquakes, is thus provided.

Fire Resistance

Besides this superiority, it is the unanimous conclusion of such authorities as the National Fire Protection Association, the United States Department of Commerce Building Code Committee, the Inspection Department Association, the Chicago Mutual Fire Insurance Company, the Underwriters' Laboratory, and many others, that four-by-four sections of wood will resist fire as well as an exposed steel truss, while six-by-six inch sections of laminated wood will be superior in resisting fire.

This seemed a surprising fact, but Mr. Hanisch went on to explain that steel, unlike wood, expands considerably if subjected to heat. Thus a bare steel truss, if heated to even 500 or 600 degrees, could force the walls of a building out of plumb long before any other serious damage will be done. In case of fire, bare steel work is quickly distorted by heat, and complete failure under tension may occur as low as 1,200 degrees—and ordinary fires reach much higher temperatures. Laminated wood, first of all,

FACTORY-BUILT, INSULATED PLYWOOD PANELS, built by Unit Structures, Inc., are being placed on top of glued laminated arches. Such glued laminated arches have been erected for a 50-foot span building (clear spans have been made as wide as 180 feet). Pre-fabricated, insulated panels, placed from arch to arch, are rapidly lifted into place; thus, the job of closing in the building is being done with a few men. Arches with finish already applied are covered with paper, which is removed after the building is all set up. Note that here the roof beam and its supporting column are a unit, having a gracefully curved, boomerang shape.



METHOD OF ATTACHMENT of panels at the eaves (left) and atop a glue laminated arch (right) is shown in these drawings provided through the courtesy of Unit Structures, Inc., and the Unicon Company, which latter organization holds the patents on the lockstrip method indicated. Even a brief study of these drawings reveals the very simplicity—and the secret of the strength—of the construction Max Hanish has popularized so much.

is not affected by heat and will fail only slowly after its solid cross section has been materially reduced by direct exposure to fire, which is further slowed down once a wood member is charred. From these technical characteristics alone, theatre management can see an advantage in their field.

Decoration

The above, briefly, are the engineering features involved; and, while they are basic, perhaps their application to specific theatre construction might be more apparent from Mr. Teichert's point of view of what they can do toward a decorative theatre interior. When asked about this, Mr. Teichert said that, aside from providing this aforementioned strong, economical and safe construction, these sections of laminated wood could, after erection, be decoratively treated with as much ease, efficiency, and effect as any other wall or ceiling surface. They could be painted, treated with plaster ornamentation, accented with molding, finished in natural effects, or in any one of a number of techniques.

But there would be occasions when it would be more practical to complete the decorations right in the factory where these units were being built. Here, after construction, the required structural sections can be finished to the desired color scheme while the surfaces are easier to get at, thus cutting down labor and attendant expense.

Shapes to Meet Each Need

Mr. Hanisch nodded assent to Mr. Teichert's words but felt he should interrupt to be a little more specific about one phase of laminated wood handling, that of the glued laminated arch. This, he felt sure, was of immense interest to architects specializing in theatre construction, or to theatre management contemplating building as soon as conditions permit, and should be explained most clearly. He went on to say that these arches, with comparatively simple engineering details, are available in any one of a number of types and a large variety of shapes to meet the specific structural needs for the complete support of a theatre. Roof loads are independently supported and transferred directly to the footings, leaving sidewalls non-load-bearing areas, which results in unrestricted freedom of design and use of materials. Besides having all the commendable features of laminated wood mentioned in general above, this type of arch makes new theatre construction amazingly quick, economical, permanent, safe, and acoustically correct.

As to the decorative qualities of these arches, Mr. Teichert noted that they can be emphasized or played down in the scheme of the interior as required by the over-all scheme. The very simplicity of the arches aids theatre decoration by providing freedom from cobweb trusses which interfere with ceiling height, treatment, lighting, and ventilation. Furthermore, this new construction combines functionalism with clean and uncluttered beauty of line.

ALL-WOOD PRE-FABRICATED THEATRES

Mr. Hanisch agreed and went on to say that the use of these arches makes it feasible to carry the discussion of the importance of laminated woods to theatre construction even further. For inasmuch as this most serious of the engineering problems involved has already been met by the glued laminated arch, it is to be wondered if an all-wood pre-fabricated theatre is not in the very near future. Such a theatre, with glued laminated structural ribs as its backbone, would have panels of wood or other materials. Mr. Hanisch wanted to emphasize that this is not by any means a matter of theory.

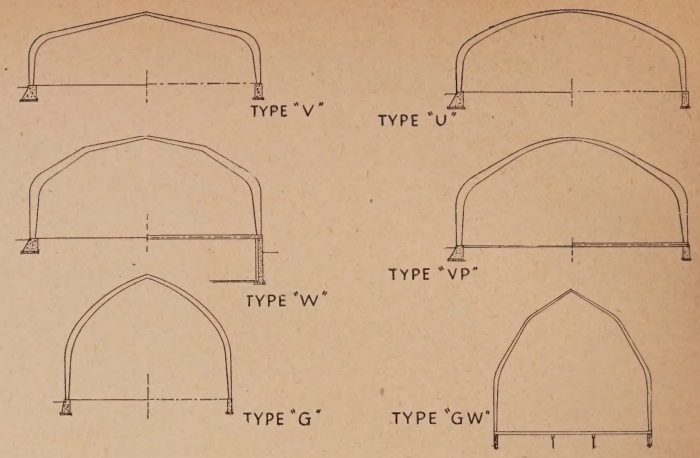
Precision-Built Panels

This construction has proved itself to be of great practicability in all weathers, climates, and conditions. To document his argument, he goes on to say that of all the various systems of pre-fabricated construction he has seen, and his company has built, he is sure that the Unicon precision-built system is the most flexible and practical of the entire lot. A very large number of precision-built panels have been constructed in mass production for the Unicon Company, who hold the patent rights. These panels were used by various government agencies for buildings which were shipped into many parts of the world, and there they withstood the tests that have been mentioned with the utmost success.

But the Unicon system excels in another way, according to Mr. Hanisch, that is in its complete simplicity. Some of this simplicity includes the fact that the panels need not be especially marked, since they fit anywhere with no lefts nor rights, no tops nor bottoms; the standard panels will fit into walls, floors, and ceilings; and they are assembled with the aid of ingenious locking strips requiring the use of no tool other than a

FIRE RESISTANCE, wood versus steel, is eloquently set forth in this picture, used through the courtesy of the Casein Company of America. The laminated, 12x16-inch beam proves that wood does not collapse: it holds until the cross section is actually reduced to the breaking point by steady flame, thus oftentimes allowing the valuable time in which to save the structure. A modern, glued laminated member, with fire-stop inserts and treated or coated with fire-resistant material, would have showed far greater durability it is asserted.

screw driver for the rapid erection of walls and ceilings. Further, the precision-built panel system demonstrates a unique value should a theatre location become due for a change because of some local condition. Then the structure can easily be dismantled and its light sections moved to a new location. This feature has successfully been used during the war when inexperienced workers erected and dismantled these Unicon structures without special instructions. Finally, this ease with which these panels can be set up and taken down again permits quick replacement of a damaged section, while the moving of entire partitions allows for changing the size of rooms as conditions require. The maneuverability and free use of these self-supporting panels is of real value as a time saving factor alone, besides its many other advantages.



TYPES OF ARCHES, as is indicated in these drawings, provide for type of auditorium desired. Unit Structures, Inc., fabricates other shapes, being limited only by the shaping possibilities of the individual laminations.

Utility of Panels

The all-wood theatre began to develop into reality as Mr. Hanisch went on to explain that these all-important panels are made in many sizes, and are available in all the various curvatures to conform to the shape of the structural arch in use. Furthermore, panels on outside walls and roofs can be hinged, obtaining a louvered effect. In this manner, quick and effective natural ventilation can be obtained throughout the theatre in moderate weather or climate. Roof and ceiling panels could easily be connected in staggered formation based on laws of sound deflection which would make obsolete the use of special acoustical materials which are being used today to correct acoustics that are not obtained with the proper design of ceiling in the first place. The staggered formation of roof panels which is suggested above can be practically applied for floor construction to provide the proper rise for the seats. Such panels could be shipped to the building sites with heating ducts and ventilation outlets already built in which would dispose of, at one and the same time, the old mushroom type of outlets. Floor panels could easily be coated at the factory with hard finishes which are impervious to dirt, water and acid.

New Seating Ideas

So far so good, in the development of the all-wood theatre. Now we are ready for some seats and Mr. Hanisch was ready for that one. He explained that improved seating facilities can be cleverly obtained by taking a lesson from the aircraft industry in molding plywood to body shapes. Mr. Teichert interrupted with the remark that single or double seats (or so-called love seats) can be economically made and covered with sponge rubber or seafoam padding, in turn covered with materials developed of long-wearing and colorful synthetic upholstering fabrics. Such seats also conserve more floor space, permitting a larger seating capacity in a given area.

Rest and Toilet Rooms

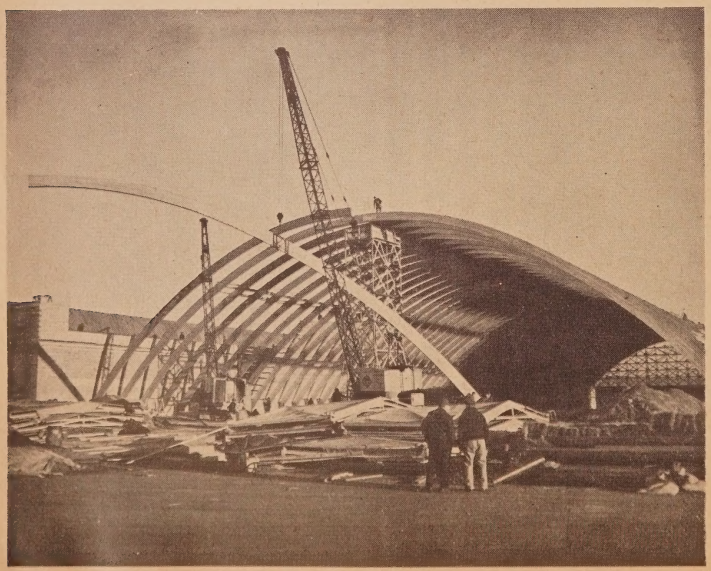
As for public rooms, Mr. Hanisch said that precision-built paneling would be available for toilets and such rooms as these would require sanitary walls. These panels before installation could be coated with impervious finishes of any color or texture. Shelving and recesses for illumination boxes, special lighting effects, exit boxes, etc., would all be provided within the panels at the plant where they were manufactured.

Decorative Methods

Every technique employed in conventional handling can be used to good advantage in this assembly line method of finishes for the interior faces of panels, such as applying photographic finishes of marbleized effects, rare wood veneer or reproductions of them, metallic foils, or any type of leather, cloth, or even reproductions of leopard or zebra skins. As to the exterior surfaces, porcelain enamels, aluminum, or brightly colored plastic coatings, which are fire- and weather-resisting, can be applied in this same practical manner. These panels are then protected against handling until assemblage and, when erected, constitute a completely finished and practically decorated building.

Mr. Teichert thought that another advantage would be that these finishes would become an integral part of the panels, offering a much more impervious surface of smoother and harder finishes for easy maintenance. Feature panels could be furnished with embossed plastic effects in geometric and sculptured

THE NEEDS OF THE SERVICES spurred the use of glued laminated members. At the United States Army Modification Center, at Saint Paul, Minnesota, 60 such arches, each 170 feet wide, were fabricated by Unit Structures, to provide a structure of 102,000 square feet of unobstructed floor space for necessary services.



THIS AMUSEMENT CENTER—the Riverside Ballroom, at Green Bay, Wisconsin—employed Unit Structure's glued laminated arches, decoratively treated in the shop before erection. The arches have a continuous curve, but can be had in other shapes—in any shape, in fact, to which a single lamina can be bent. This type U arch has a span of 53 feet, a center height of 17 feet, 8 inches, and a column height of 9 feet. The arches are spaced 16 feet apart. Max Hanish, one of the founders of Unit Structures, was the architect.

designs, either protruding or incised. Since interior panels need not be filled with insulation materials, they can be arranged to provide translucent silhouette effects. The simple joining method also permits panels to be assembled in ashlar pattern instead of the standard vertical position.

New Art with Wood

Besides these advantages, Mr. Teichert could see further possibilities in the designing of interiors through the use of these panels inasmuch as they would also be available in oval, circular and spherical shapes to obtain domed ceilings, curved walls, partitions, or projecting soffits for indirect lighting over seating recesses, display panels and candy counters. He had a further inspiration in the matter of featuring all-wood decorations in order to point up the all-wood construction. He could visualize the setting of decorative carved panels into the lobby walls above a dado of matched exotic woods. Pierced grilles of wood might grace the wood staircase and balcony.

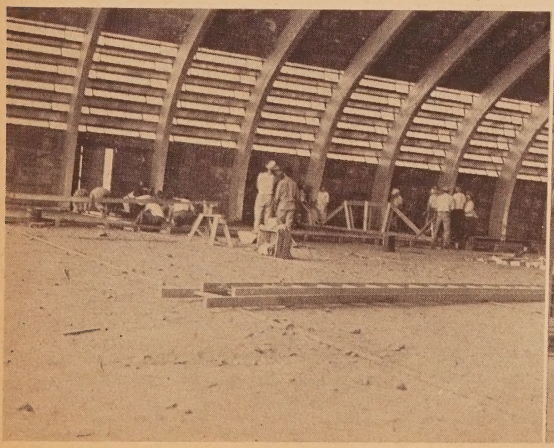
Then in the auditorium he thought large scale horizontal bands of contrasting wood tones might be used along the walls with smaller scale vertical stripes providing a foil in the dado. Pierced fretwork would provide another treatment both decorative and different to accent the proscenium arch. He was sure that there would be no lack of an abundance of interesting materials to work with and still not run out of decorative variety, and all within the one medium of wood or wood products. Naturally this amount of wood would produce an interior of rather monotonous tannish tones but this is where a skillful decorator would come to the aesthetic rescue. According to Mr. Teichert, color accents could be designed and distributed throughout the interior so that the wood tones were made to appear live and dynamic by contrast. Hand decorations on wood panel backgrounds could be another effective way of dramatizing their soft neutral tones and textures.

SUMMARY

In fact, this might be the ideal theatre to build in a community where wood or wood products are the pre-eminent interest of many of the patrons. That might be a lumbering community in the northwest, or a mill town in upper Wisconsin or Michigan, or a woods-products area in the southeast where kraft paper, fibreboard and similar pulp woods are treated. The theatre would be allied to that community and custom made for it to a degree that no other construction or treatment could produce, and still be strongly, safely, economically and beautifully built as well.

Yes, it is true that, while in some localities present-day building codes might possibly prohibit the use of an all-wood or entirely pre-fabricated theatre, recent test data and highly efficient methods of fire-proofing now available would seem to project this dream theatre into sudden reality. At least, Mr. Hanisch and his associates are sure that this type of construction is eminently suitable for modern American theatres, of both large and small size; and so, on the advice of an expert, it might be well to check into these advantages more closely where new construction is being contemplated.

THE NEEDS OF WAR spurred construction of this type. Through the courtesy of the United States Army Air Forces, here are two views of a hangar-type building, such as those for which Unit Structures supplies the glued laminated arches. Here is seen one method of providing such buildings with light and ventilation.



Fundamentals of the Economics of Building

Six Basic Principles of Good Engineering And Need for Expert Advice Are Set Forth

The first thought in planning a theatre—or, for that matter, any project—must be in terms of ultimate value, either in terms of dollars and cents of the invested capital or in terms of the project's intrinsic worth to the community or purpose.

In order properly to carry through a finished project, one must start from the very beginning and formulate and synchronize each and every detail so that, when the structure is completed, all its parts will function in such a way as to produce a maximum of efficiency at a minimum cost.

Inasmuch as we are already concerned with theatres, let us assume, first, the Almighty Dollar be kept in mind as the standard of measurement by which final results may be judged. Before beginning our consideration, one thing should be clearly understood: that of the trio comprising size, cost, and quality, only two can be achieved.

To analyze this statement, it can be assumed, as is always the case, in order that a project be a financial success, a certain fixed sum most be set up as a final cost for the building, as well as for land, equipment, and other requirements. To keep within this cost, one must either sacrifice quality or size of building. In other words, if a certain area, or size, of building is required, it must be constructed to keep within the fixed price, even if lacking in quality; or, if quality is most desired, then size must be reduced to keep within the price. From this, it will be readily seen that the proper planning must begin with the project's inception. Too often haphazard planning, or planning in reverse, is a major cause of failure.

Before going further, suppose we assume a hypothetical case. You wish to operate a theatre at a profit. To do so you must acquire, either by ownership or lease, the necessary land, you must purchase the required equipment, you must lease or construct a theatre building, you must provide for working capital, and you must arrange for the "raw materials." Eventually, to do this, you must have complete knowledge of all details entering into the entire proposition before being able to decide upon any final course of action.

A proper procedure is first to consider the proposition in all its details, always keeping in mind that a maximum rate of return must finally be the goal if continued success is to be achieved.

No greater contribution to better planning can be obtained than expert advice. Such expert advice must include the unbiased opinions of qualified persons. At the very beginning, if the one whose duty it will be to carry through the entire proposition is not a thoroughly competent engineer able to handle every phase of the project, his first duty should be to employ the services of a consulting engineer, or engineering organization capable of supplying all technical, as well as financial, information in the form of statistical reports, layouts, specifications, details, and cost data for final approval, before any attempt is made to proceed with actualities. The cost of such advice is, in the long run, the cheapest item of expense in the entire proposition. Usually in large undertakings, every kind of engineering is required, such as the civil engineer, who reports on proposed construction, acquisition of land, utilities, and work of similar nature; the mechanical engineer, who reports on steam, gas, power, and equipment; and the electrical engineer, who considers power transmission systems and other things. All of their reports are submitted to the chief consulting engineer who, in turn, correlates the information into one final report which is ready for the one who has the final authority to pass on the project for approval.

Every organization is continuously investing money in the anticipation of an appropriate return. Engineers are employed to help solve these problems of investment and return, alway endeavoring to answer the question, "Will it pay?"

There are far too many examples of poor judgment exercised by business men and organizations in assuming that they are fully capable of deciding economic and other problems. These assumptions are based on the idea that they have had a great deal of experience in business. All of which may be true. However, they miss the point that an engineering specialist, who has devoted years of effort in preparing an organization for the express purpose of making extensive research, collecting and preparing data, correlating statistics, and analyzing all the technical features of any problem entrusted to it, is much more qualified to render expert service. Such a report has more definitely valuable information for investors and bankers who may be approached.

The necessity of using the services of a competent engineer cannot be over-stressed. Also of great assistance all along the line is legal advice. Although legal counsel does not claim to comprehend all of the engineering requirements, it certainly should have a prominent part in the proper guidance of any project, and should be active in guiding the development from the very beginning. Experience has taught the fallacy of inexperienced persons endeavoring to handle construction. The engineer should be given complete charge without interference from other sources. Any competent engineer will gladly cooperate to the utmost in order to produce the best results, but cannot if he is not given a free hand in making final decisions. Just as good reports influence proper decisions of procedure, so does the value of good engineering influence the planning of construction and the final successful operation of the projects. Therefore, the money spent for good engineering services becomes another of the cheapest investments.

THE SIX "COMMANDMENTS"

The following is a guide to the six cardinal principles of good engineering:

1 A thorough understanding of all the intricate details entering into the product to be manufactured (entertainment) should be mastered before starting.

2 The engineer's relation to his client should be strictly confidential and purely professional at all times.

3 The preparation of plans, drawings, details, and specifications should be complete in every detail in order that, when the theatre is finished, it will be a complete one of its kind.

4 The receiving of bids and awarding of contracts should be in strictest confidence, without prejudice or favor, all subject to the owner's approval.

5 The supervision, issuing of estimates, and inspection should be honestly performed with no thought of favoritism, either to the contractor or owner but strictly in accordance with the plans and specifications upon which the bids were made.

6 Finally, all accounts pertaining to the various contracts should be accurately maintained, and a complete recapitulation should be furnished to the owner at the final completion, together with copies of all daily work progress sheets, and so forth.

POST-WAR PLANS BY THEATRE ARCHITECTS

With the exception of a small number deemed necessary for maintenance of home-front morale, no theatres of importance were built in the United States during the war years. Accordingly, it is not possible for THE THEATRE CATALOG to follow its custom and present a photographic review of the previous year. In its place, there is presented the post-war theatre ideas of the nation's leading architects—96 pages of sketches and drawings of theatres to meet any demand. In subsequent issues of THE THEATRE CATALOG, many of these theatres, as they become realities, will be presented in pictorial detail.

As the epitome of functional design, it is a pleasure to present a review of Frank Lloyd Wright's Museum of Non-Objective Painting, as a fitting introduction to this new era of theatre design. Though not a theatre, this structure for the Solomon R. Guggenheim Foundation is so theatrical in concept and so designed to blend the ultimate aims of the building with the needs of those who will use it, that it cannot help but have a great influence on the theatre architecture of the future.

THE EDITORS.

Objective Design for Non-Objective Art

The First "Living" Building Is Created As the Apotheosis of Functional Design

By FRANK LLOYD WRIGHT

For the first time in the history of architecture a true logarithmic spiral has been worked out as a complete plastic building: a building in which there is but one continuous floor surface: not one separate floor slab above another floor slab, but one single, grand, slow, wide ramp, widening as it rises for about seven stories; a pure plastic development of organic structure. If pulled from the ground and tossed away, the whole thing would bounce intact.

The main structure is monolithic throughout, pre-stressed in high tension reinforcing high-pressure concrete. The exterior and interior will be faced with polished marble aggregate. The only exception is the greatly extended ground-floor surface, which will be a continuous pavement of large marble slabs. The galleries taken altogether afford approximately three-quarters of a mile of day-lighted wall surface, perfectly adapted—either by daylight or night light—to the convenient display of paintings. There will be no hangings of the pictures: all will rest on a prepared base which is part of the wall. Throughout the structure, artificial lighting comes from the same source as day-lighting, and is incorporated within the construction. From wells in the great rotunda under the glass dome, changeable, prismatic illumination plays upward and outward from electrically controlled fountains of light, not only illuminating the great open central space of the grand ramp, but going outward over terraces and gardens.

Not only is the entire monolithic building plastic in form of a rising spiral, but it is also plastic in actual construction. Glass in the form of Pyrex tubing is extensively used to light and seal the interiors. The solid floors, ceiling, and walls are all lined with cork to insure good insulation and noiseless movement. Quiet floor surfaces and ceilings are uniform with each other, altogether contributing to the great repose of the spacious interior. The whole is a well-studied background for the paintings to be displayed there.

Starting in the theatre below the ground, it would be easy to go up in a wheel chair and come safely down again without undesired interruption. Or, taking the fast ramps, concentrated in a tower on one side of the grand ramp, visitors go easily and quickly up and down. Elevator service is stationed at the center of this tower and is directly connected with the grand ramp at each level. Two plunger elevators are located at the center at each recurrent ramp level. The open center of the grand, central chamber, made by the ramp, is wider at the top than at the base by about 24 feet, and open to the sky, but covered by a shallow glass dome shedding nightlight as well as daylight.

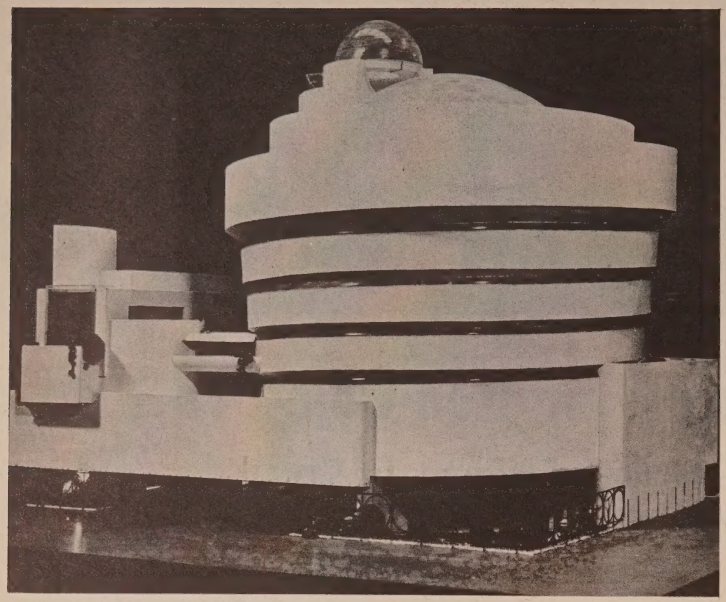
The entire building is a completely floor-heated, air-conditioned vault, adapted throughout to the safekeeping and becoming display of not only valuable paintings by great masters but the paintings of contemporary artists and students as well. The interior is absolutely fire-proof, dust-proof, and vermin-proof. A constant moisture content will be maintained throughout the changing seasons.

As people come into the museum through the entrance vestibule, they pass across a perforated metal floor through which air-conditioning apparatus, operating like a vacuum cleaner, creates suction to draw dust from feet and clothes, make it less likely for dust to come into the building. All entering air is washed, filtered, tempered, and discharged at slow speed into every portion of the building. The temperature changes within will, therefore, be negligible throughout the course of the years, enabling all glass coverings and frames to be eliminated from the paintings. The vast collection of paintings is so situated and displayed that wall surfaces of the building itself automatically frame them in a setting suitable to each and every one of them. Desired changes may be made with little effort and special exhibitions will be easily arranged to advantage in as many ways as imagination may dictate.

All effects are integral parts of the building itself, either exterior or interior. Comfortable seats are features of the design, so that any painting may be viewed comfortably. Administrative offices alongside the museum are developed in the same general character, so that conduct of the affairs of the museum can be directly under the supervision of the curator as needed. A number of studios for preparatory work for exhibitions and the research continuously sustained by the Solomon R. Guggenheim Foundation are provided for upon the upper levels of the building. These upper levels terminate in a conservatory filled with plants, above which, to one side, crowning the tower for the elevators and fast ramps, is an observatory where an adequate astronomical telescope will be installed for general study of the cosmic order.

Not only the proportions, but method of construction of the building, are in perfect keeping with the plastic nature of the design, so perfectly adapted to its purpose that the paintings it displays will be at home in environment admirably adapted to their character. The entire structure will be securely founded upon bedrock, 50 feet below the street level, and will be of the most enduring character known to modern science. Requiring little maintenance, the edifice is virtually indestructible by natural forces — earthquake-proof, fire-proof, and storm-proof. The building is intended to be a reposeful center for all interested in the art of painting as a source of human culture: a window open upon the future of painting as a progressive, responsible, cultural art, indispensable to modern life.

An interesting feature of the building is the fact that grandomania is discarded. All in all, it is proportioned to the scale of the human figure. This is true

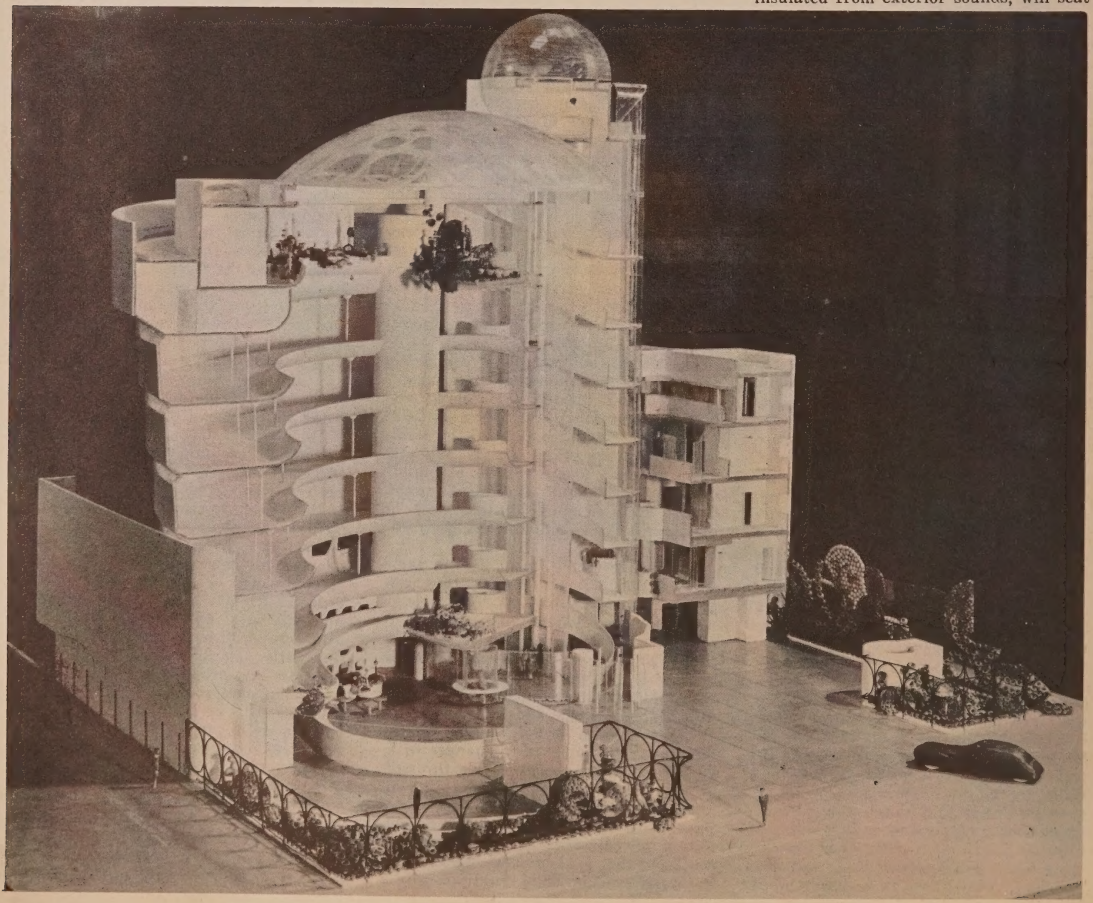


not only in every detail of the new gallery, but of the organization and uses of the building itself as a whole.

In a corner of the first floor of the building, a globular laboratory is designed wherein experiments in the sound-projection of movement and color in various forms of picturesque animation can be made and exhibited to a small group of about 100 people. Experimental work in this art and the art of painting will be encouraged. Projection in this chamber for experiment will be from a pit in the floor under the center of a shallow dome. Reclining chairs will make it comfortable to view the domed ceiling as well as the walls.

A large, high, and spacious, quiet inner-gallery is concealed below the main-floor level, but partially revealed to the main gallery in which will be shown the great masterpieces of the new movement, collected by Solomon R. Guggenheim and the director, Baroness Hilla Rebay, and which for eight years have characterized the Guggenheim Foundation, provisorily and partially shown to the public now at 24 East 54th Street.

Under the main gallery, there is a cinema, entirely below ground, where films may be projected from behind the screen or projected upon it from the front. This inner chamber, completely insulated from exterior sounds, will seat

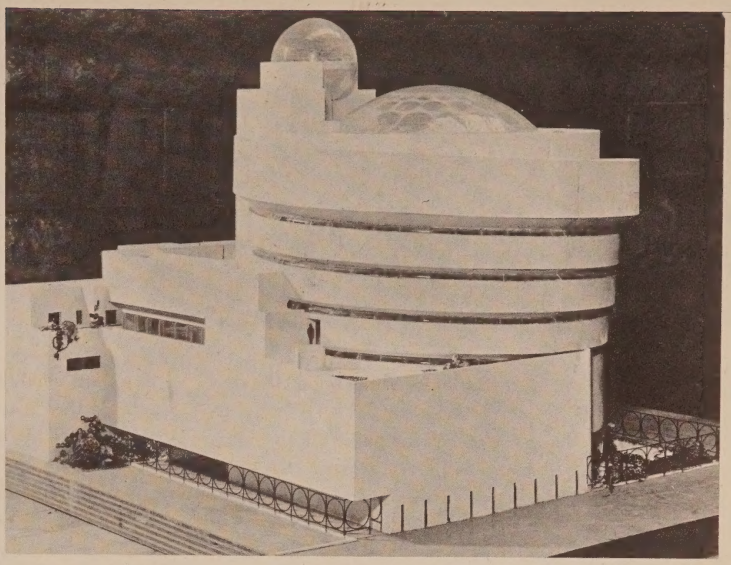


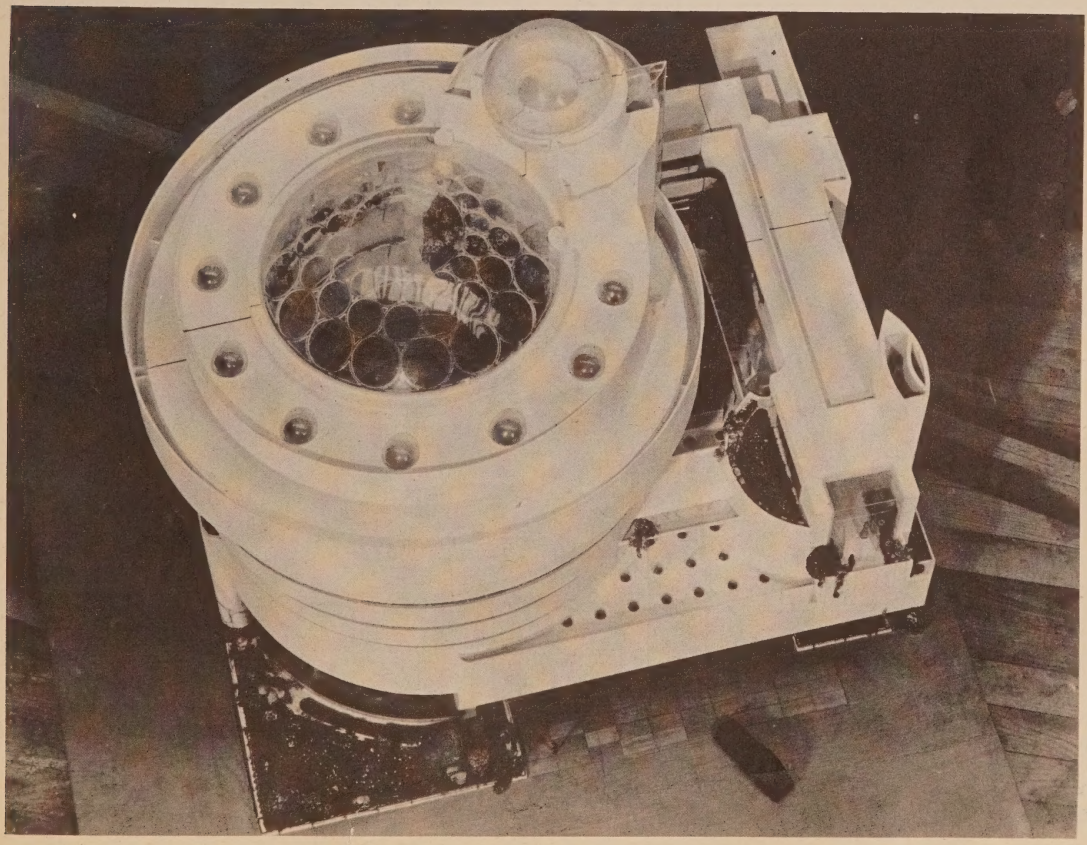
400 to 500 persons. This novel subterranean room is also admirably suited to chamber music and various other forms of educational entertainment. Entrance to the cinema is through the museum and exit is had directly to the street through an outside sunken garden on Fifth Avenue.

Provisions have also been made in this connection for green rooms, experimental workshops, and also for the safe storage of choice film collections recording the work of the Foundation. For film research in many different directions, cinema workshops and research laboratories are not only provided, but are equipped with the latest apparatus for experimental work. Adequate clerical, shipping, and receiving accommodations are conveniently arranged independently of the main museum.

On the ground floor, facilities for an adequate and intimate cafe service are provided. A charming banquet hall and board room are located on an outside terrace beside the grand ramp opening to the court overlooking Fifth Avenue.

And finally, this building will be permanently in the heart of New York upon one of its proudest avenues—the gift of a farsighted philanthropist—one of a great family of philanthropists—who loves his city and sees the growth that lies now at the threshold of its future.





LUBLIN, McGAUGHY and ASSOC.

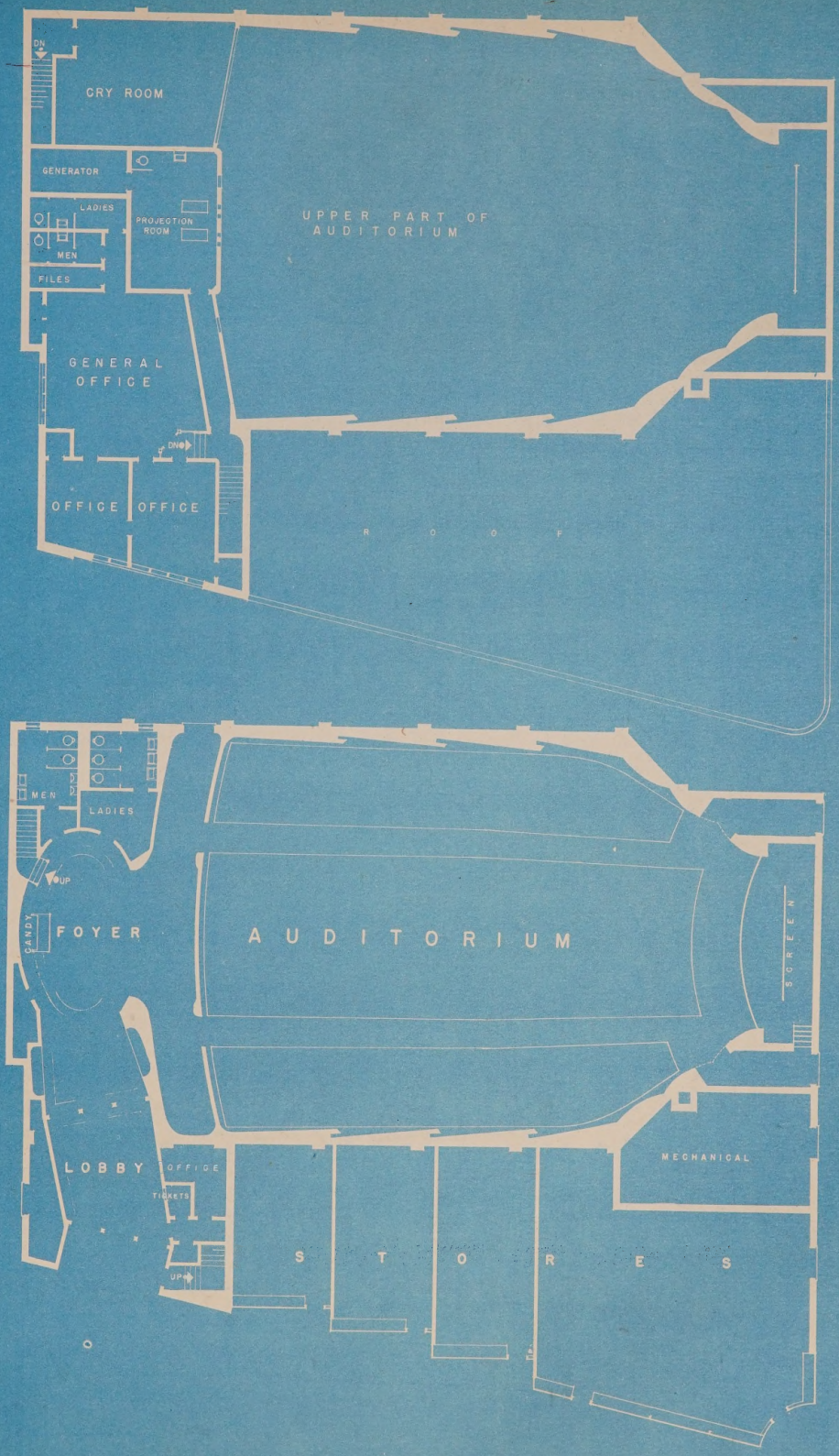
Presents

The Riverview Theatre

Norfolk, Virginia

Designed as a comfortable neighborhood theatre, seat spacing is 38 inches and seat width 21 inches. Because the 700-seat auditorium parallels the main street allowing for several large stores, the usual problem of an L-shaped project was encountered and pleasingly solved. The oval shaped foyer is the key to this solution for it not only sets a note of luxury back of the standee area, with a better traffic flow; but accommodates the utility features of men's and ladies' lounge rooms, entrance to the second floor cryroom or private theatre, and a prominent location for the candy counter. As the lead theatre for a small circuit, note the executive offices will be located on the second floor, with their own private entrance, while the house manager's office is off the lobby.

BRIGHTLY COLORED PORCELAIN ENAMEL, COMBINED WITH STRUCTURAL GLASS, WILL PROVIDE A FRONT WHICH IS ACTUALLY ONE LARGE SIGN. THE SIMPLE PYLON EFFECTIVELY DISPLAYS THE UPRIGHT SIGN.


DN
CRY ROOM
GENERATOR
LADIES
MEN
FILES
PROJECTION ROOM
UPPER PART OF AUDITORIUM
GENERAL OFFICE
DN
OFFICE
OFFICE
R O O F
MEN
LADIES
UP
CANDY
FOYER
AUDITORIUM
SCREEN
LOBBY
OFFICE
TICKETS
UP
MECHANICAL
S T O R E S

M. J. DE ANGELIS

Presents

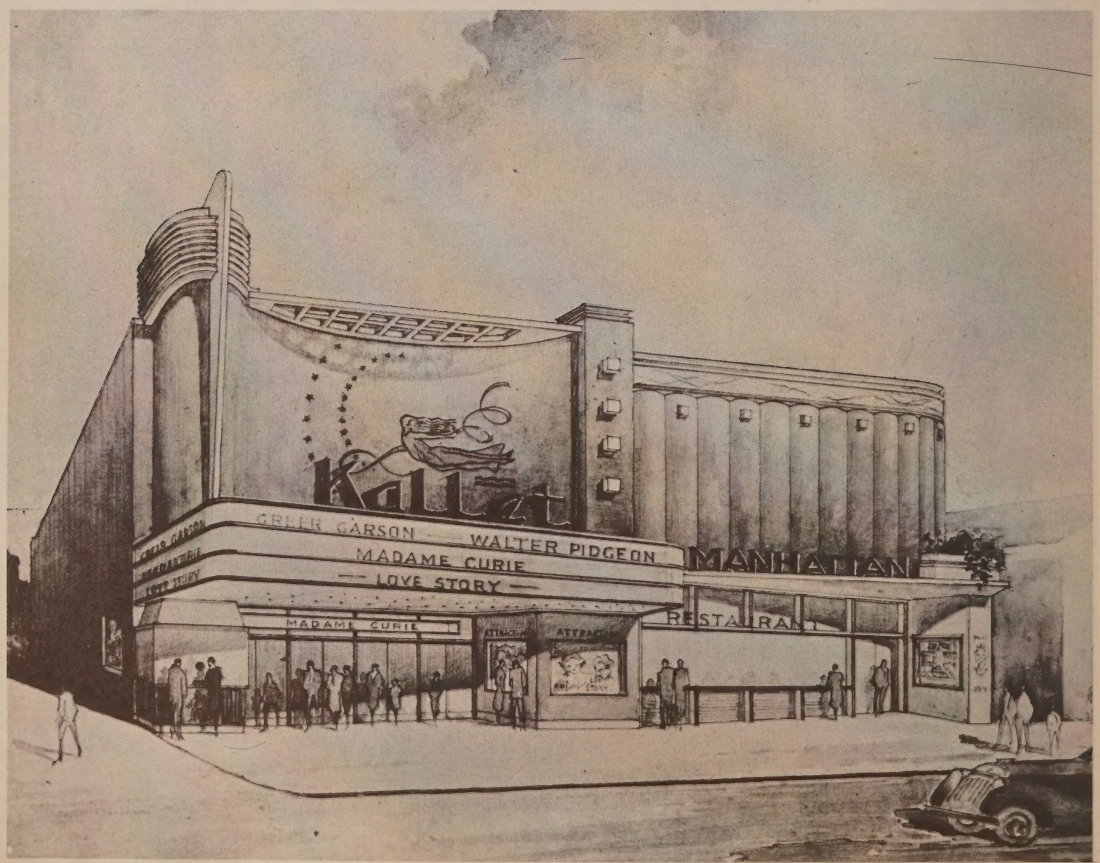
The Kallet Theatre

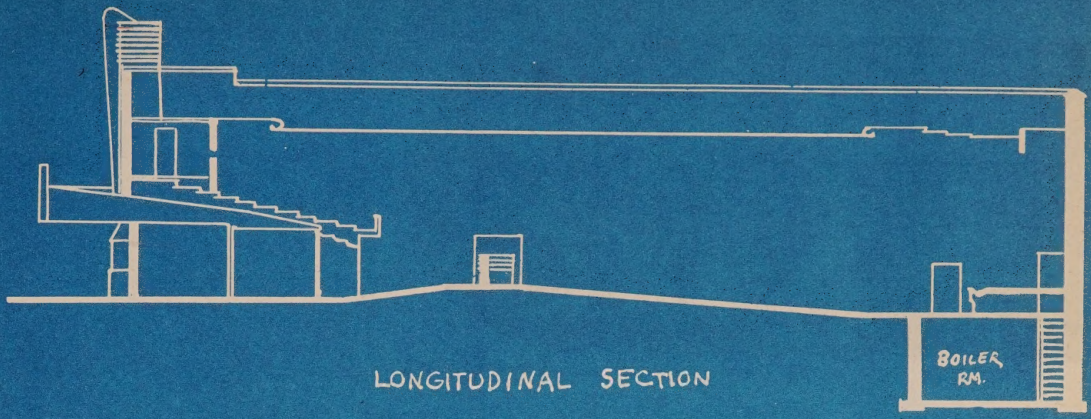
Rome, N. Y.

This project for the Kallet Theatres, Inc., of Oneida, New York, is to be built in neighboring Rome, New York, just as soon as materials are available. Final plans indicate a stadium type theatre with a seating capacity of 1,000, fully air conditioned and fireproof, with one large store or restaurant. The reason for a stadium type of floor plan is the shortness of the lot for the desired seating, plus the excellent sight lines and compactness of maintenance which result from such a plan.

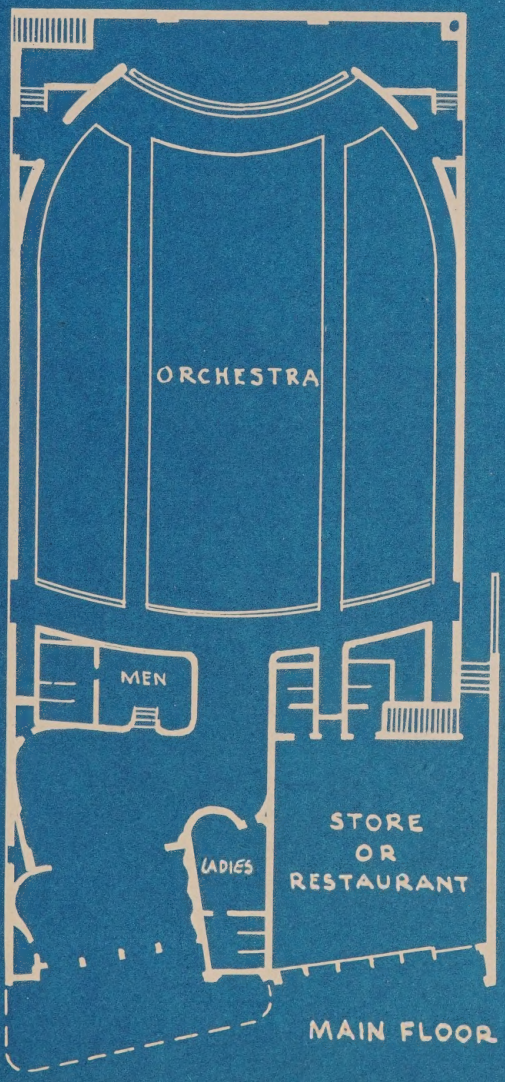
The handling of the men's and ladies' lounges promises to produce a pleasing lobby with ample display advertising spaces which will be an outstanding feature. Another architectural accomplishment is the economy in space use at the proscenium end of the auditorium.

THEATRICAL IN MOTIF, THIS FRONT POSSESSES A FLAIR OF ORIGINALITY WHICH IS INTERESTING. A RESTAURANT OR STORE IS WORKED INTO THE PLAN WITHOUT DETRACTING FROM THE THEATRE PROJECT.

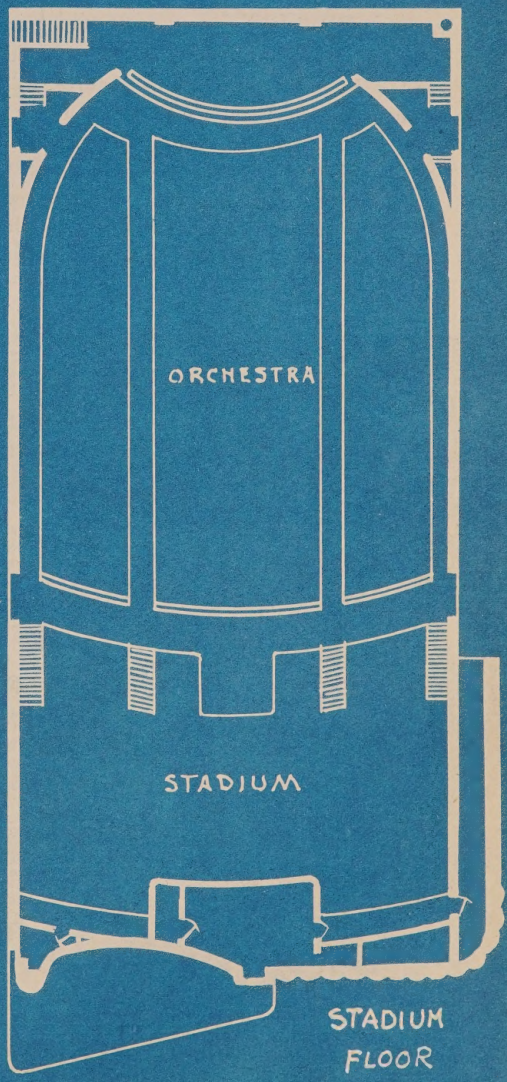




LONGITUDINAL SECTION



MAIN FLOOR



STADIUM FLOOR

VINCENT G. RANEY

Presents

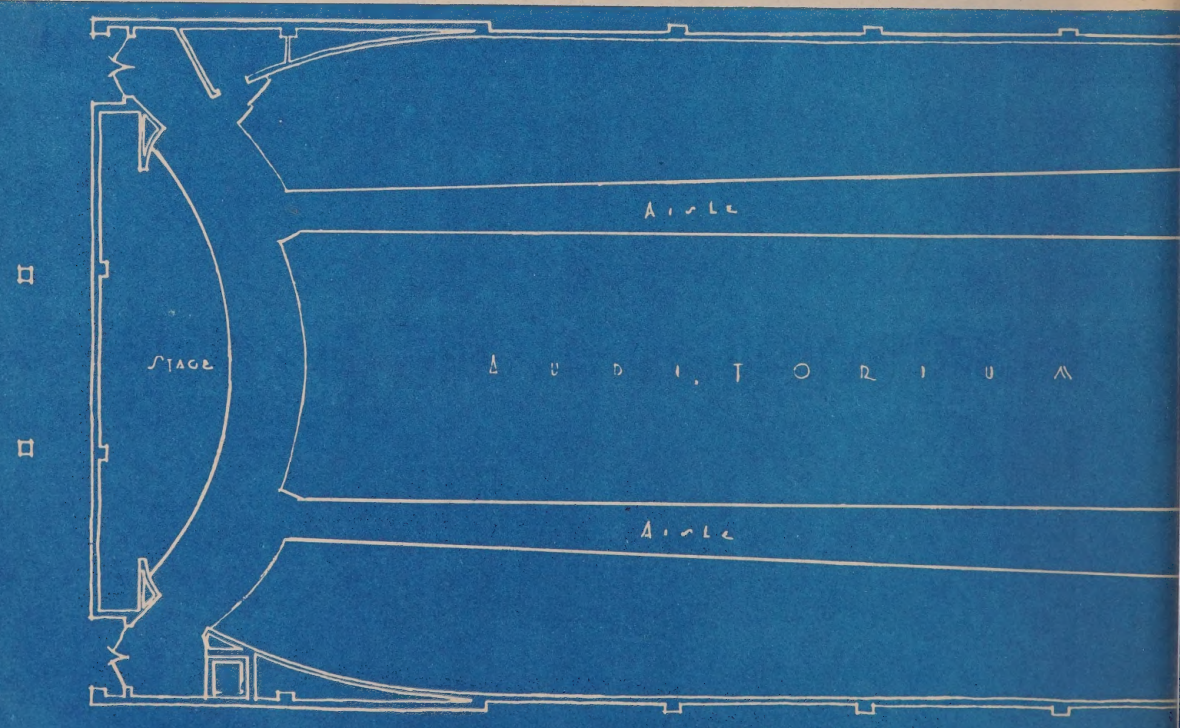
The Sierra Theatre

Delano, California

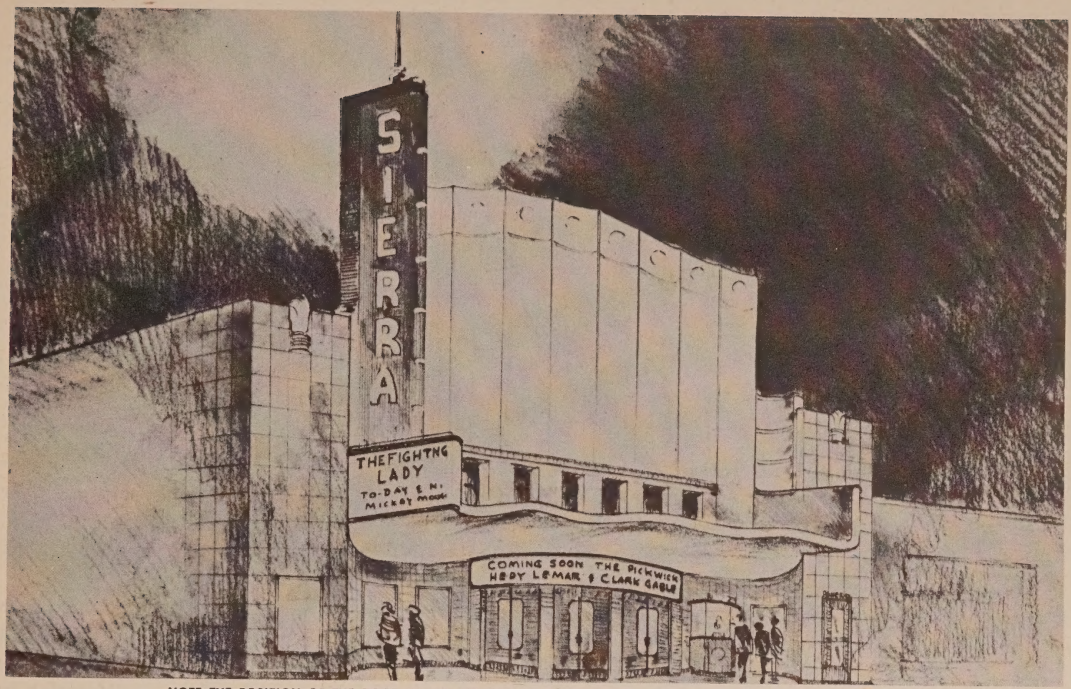
Situated in the mountain foothills 120 miles due north of Los Angeles, and on a lot 60 feet by 150 feet, this one-floor theatre will accommodate 900 seats. Intended for first-run pictures, its requirements in comfort and accommodations are equal to that of any large city theatre, and, according to the plans and specifications, have been adequately met.

A temperate climate permits direct entrance from the street to the oval foyer and a resultant floor plan that has many advantages. The positioning of the aisle heads, separated by a solid wall behind the last row of seats, will permit the use of structural glass doors and a day-lighted foyer. The warmth of the subdued lighting of the decorations and furnishings of this foyer at night is sure to prove inviting to the casual passer-by.

Under this plan there is sufficient available space over the foyer to provide adequate offices for the use of this theatre as a headquarters for the circuit or district executives, should such a need exist.

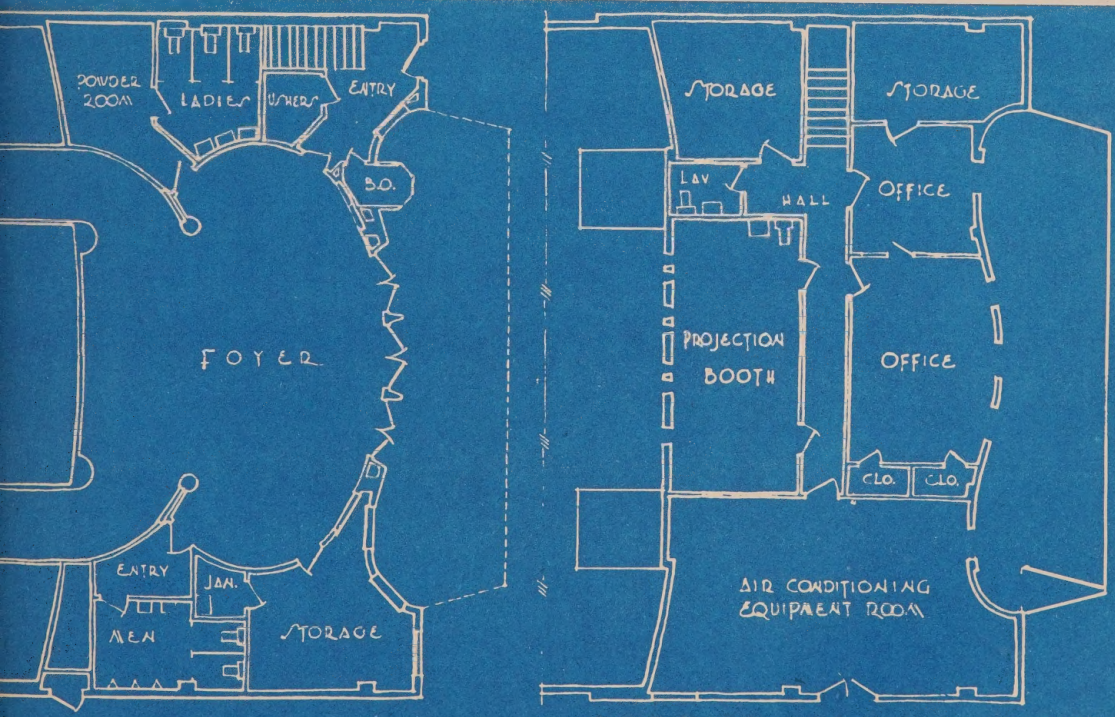


..FIRST FLOOR PLAN..



NOTE THE POSITION OF THE DOOR TO THE SERVICE SUITE ABOVE THE FOYER AND THE POSSIBILITIES IT PRESENTS TO DELIVER FILM OR OTHERWISE USE THESE FACILITIES WITHOUT ENTERING THE THEATRE PROPER.

THE PLACEMENT OF THE BOX OFFICE AND ENTRANCE DOORS, AND THE DESIGN OF THE MARQUEE CANOPY ARE ALSO INTERESTINGLY ENGINEERED TO CONTRIBUTE A LIVELY ATMOSPHERE TO THAT PART OF THE TOWN.



..SECOND FLOOR PLAN

B. F. CHURCHILL and SON

Present

An Unnamed Theatre

(Undisclosed Address)

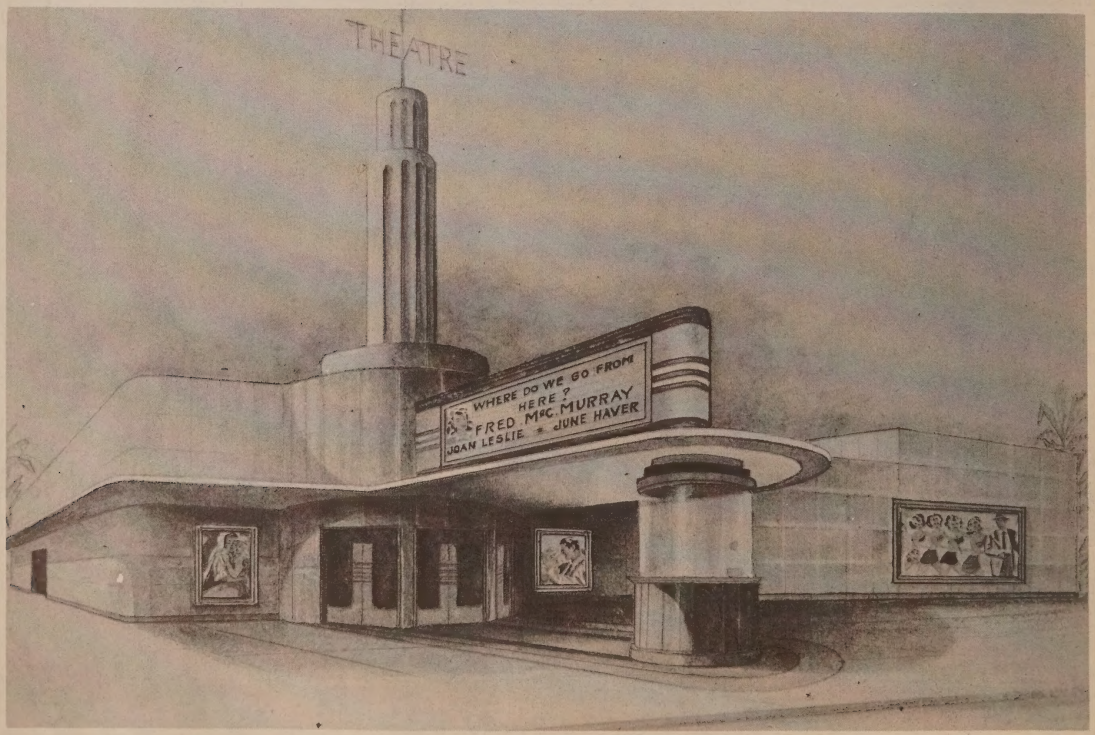
Planned for a small town or the suburban areas of a larger city, this theatre would be constructed of brick with Georgia marble or porcelain enamel block facing on the facade or street sides. Fireproof throughout, the concrete floors would be covered with carpeting in the interior and with a terrazzo combine in the lobby and exposed areas. Heating would be by steam; and cooling by mechanical refrigeration.

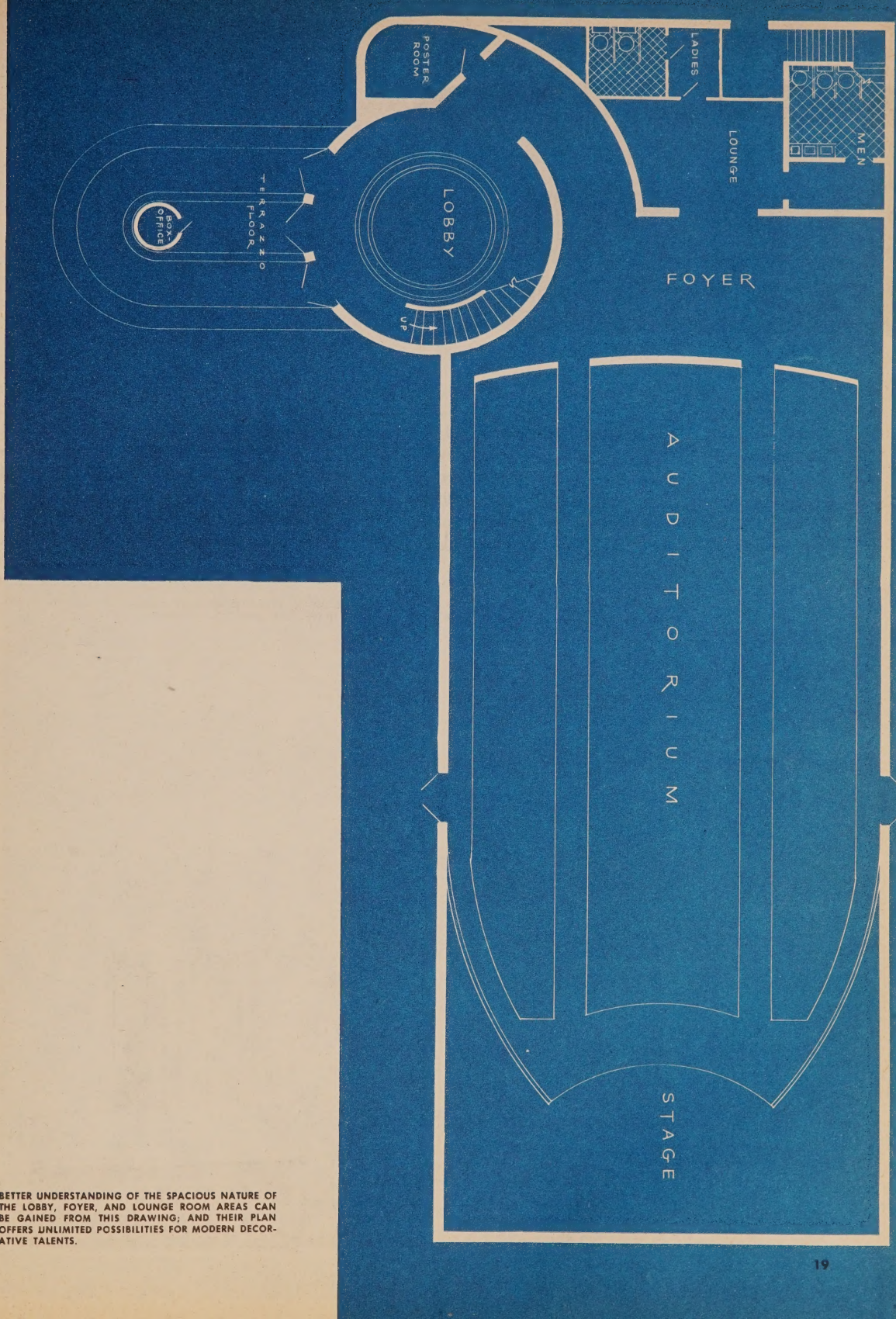
While the interior specifications are as yet incomplete, some acoustical plaster and some fiber board will produce good acoustics.

Designed for a seating capacity of about 1,000, the approximate cost is $100,000.

The manner in which the architect, utilizing an L-shaped project to produce a truly exceptional arrangement of lobby, foyer, and lounge rooms, is worthy of special note and serious consideration in

THE FRONT PRESENTS MANY DRAMATIC FEATURES IN ITS HIGH TOWER, UNUSUAL MARQUEE, ISLAND BOX OFFICE, AND UNUSUAL ADVERTISING SPACES. WHILE REQUIRING UNLIMITED SPACE, IT IS EYE-CATCHING.





BETTER UNDERSTANDING OF THE SPACIOUS NATURE OF THE LOBBY, FOYER, AND LOUNGE ROOM AREAS CAN BE GAINED FROM THIS DRAWING; AND THEIR PLAN OFFERS UNLIMITED POSSIBILITIES FOR MODERN DECORATIVE TALENTS.

ALEXANDER A. CANTIN
and
A. MACKENZIE CANTIN

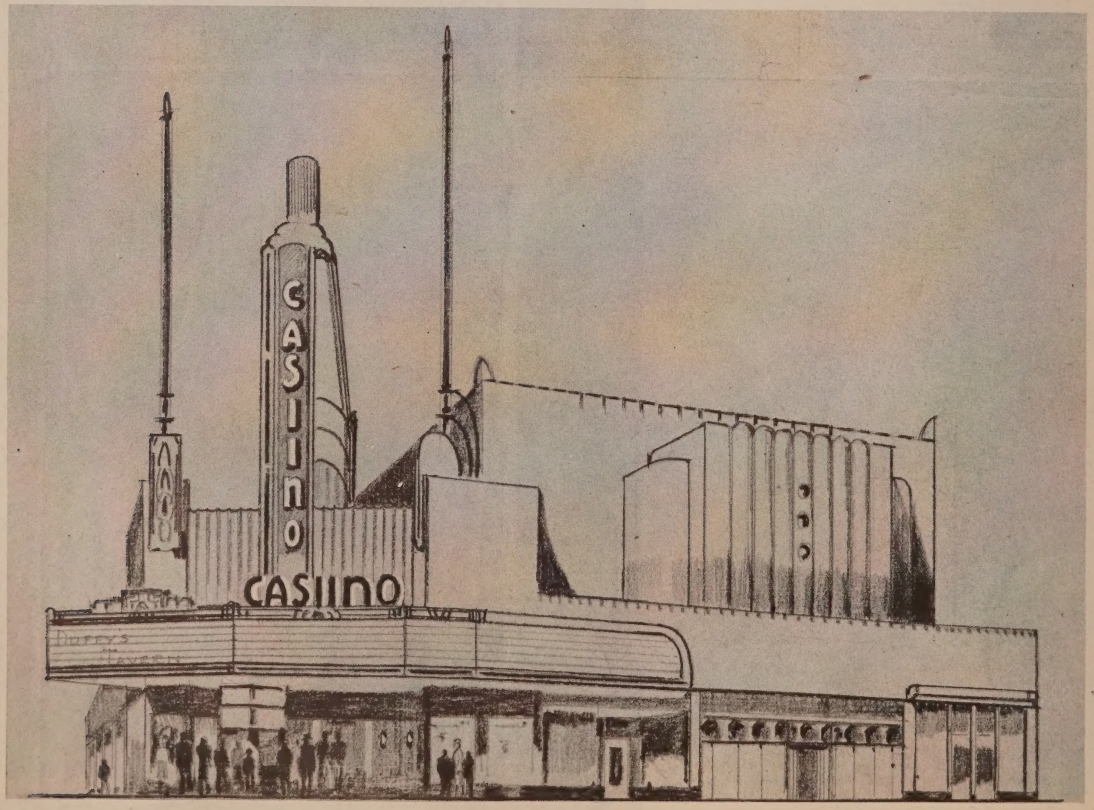
present

The Casiino Theatre

Pittsburg, California

Projected for this rural community of approximately 10,000 population and only 50 miles from San Francisco, but reflecting that city's demands for modern accommodations, this theatre will seat 1,150. Actually part of a store block, the theatre portion of the building is 65 feet by 150 feet. To exact this maximum seating from the area available and still provide the necessary lobby and lounge spaces, a stadium type of auditorium plan has been decided on, with ample spaces under the stadium for all necessary rooms and for the central location of all piping, meters, and so forth for the various utilities.

THE RELATIVELY LOW COST OF FLAG POLES AND THEIR GREAT FUTURE USE ON PATRIOTIC HOLIDAYS, AND TO ATTRACT ATTENTION TO SERVICE AND OTHER ACTION PICTURES, HAVE BEEN USED TO ADVANTAGE.



Considered as an investment project, the seven large stores will, no doubt, bring in monthly rentals which will approach the cost of the upkeep of the entire building; with the added feature that central plant heating, air conditioning, and maintenance can be shared at a low unit cost.

Of fire-proof construction throughout, the walls will be of reinforced concrete, with steel roof trusses. Complete with air conditioning, the estimated cost will be $160,000.

As the magnet which draws the business to the area of the stores, the theatre front, with its lighted pylon thrusting high into the sky, has been given the most prominent corner location; but in doing so, a difficult foyer design problem is encountered. How Alexander A. and A. Mackenzie Cantin solved this problem with a spacious L-shaped foyer can best be noted in the floor plans. Dominating the foyer in the most advantageous location is the spacious candy bar that virtually adds an eighth store to the revenue-producing qualities of the business block.

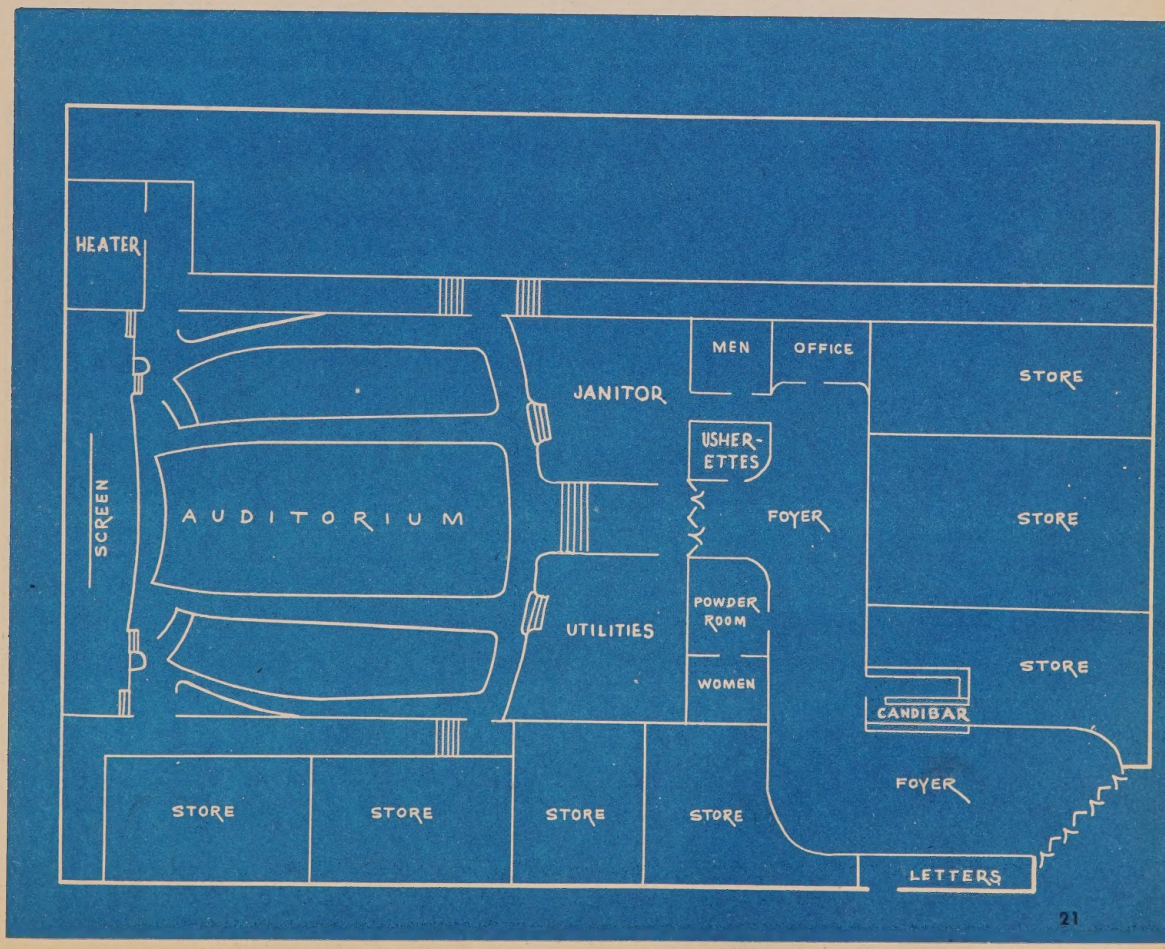
Attention should also be drawn to the planned letter room, to the left of the foyer, in which the changeable sign letters for the spacious marquee will be stored; but which also will permit direct entrance to the marquee roof for the changing of signs without the use of ladders or other equipment usually mounted from the pavement level.

The height of the auditorium box has been used to give bigness and grandeur to the building by carrying into it the fluted design of the facade.

An island box office situated in the middle of the open corner and well out on the building line will present an inviting ticket source to every passerby on the busy intersection.

The future operating history of this cold-blooded business project should be an interesting one to follow.

THE MANNER IN WHICH A STADIUM CAN TELESCOPE BACK OVER LOUNGE ROOMS, FOYER, AND EVEN PARTS OF STORE CAN BEST BE ILLUSTRATED BY NOTING THE LINE OF THE FRONT WALL ON THIS PLAN.



ALEXANDER A. CANTIN
and
A. MACKENZIE CANTIN
Present

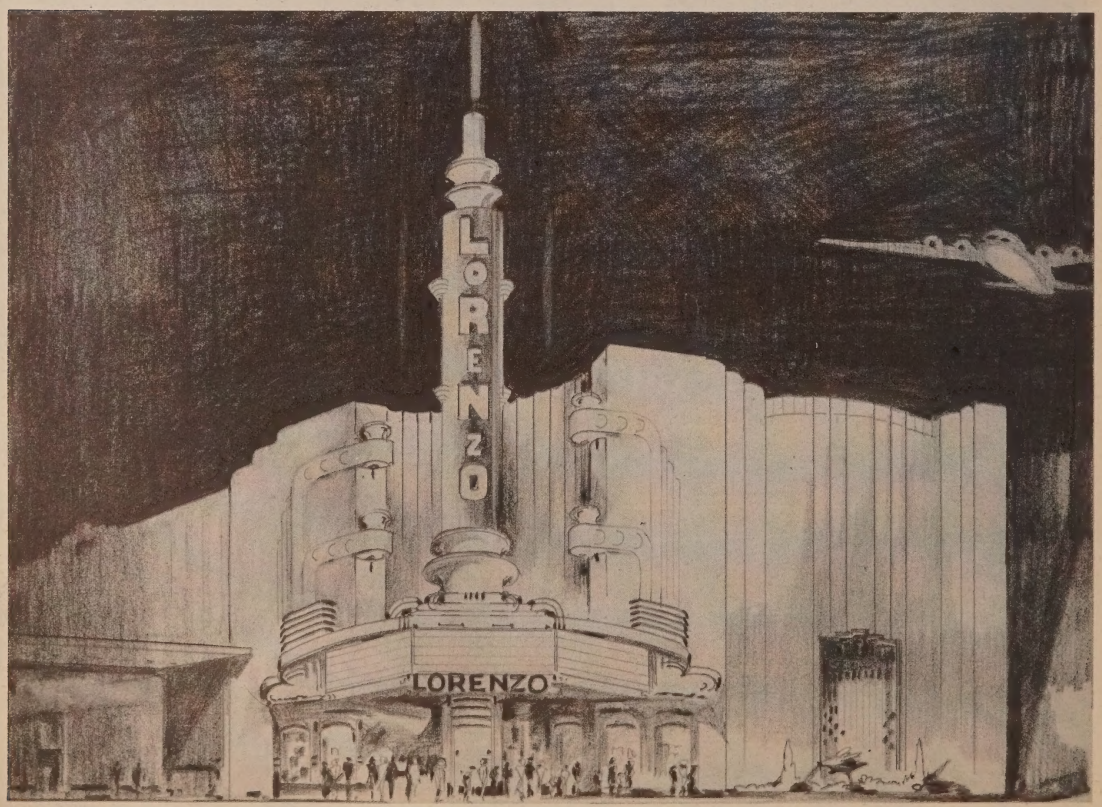
The Lorenzo Theatre

San Lorenzo, California

Now under construction in this new village of about 2,000 new individual homes located about 16 miles from Oakland, this 870 seat theatre will cost, without ground, approximately $130,000. Completely fire-proof and modern, the stadium design permits foyer, lounge, and service rooms which are seldom equalled in a theatre of like capacity. Walls are of reinforced concrete; and all auditorium walls and ceilings are fully covered with acoustical plaster. Heating is by forced hot air from gas-fired furnaces and while air is exhausted from the auditorium, no air-conditioning is deemed necessary in this climate. A crying room is screened off from the auditorium with Thermopane glass.

Across the street from the theatre, a large parking lot is operated by the theatre management.

THE FRONT IS FINISHED WITH CEMENT STUCCO WHICH WILL PERMIT STRIKING COLOR CONTRASTS BY THE PAINT. FLOOD LIGHTING IN THE NAME PYLON AND MARQUEE WILL PRODUCE DRAMATIC NIGHT EFFECTS.

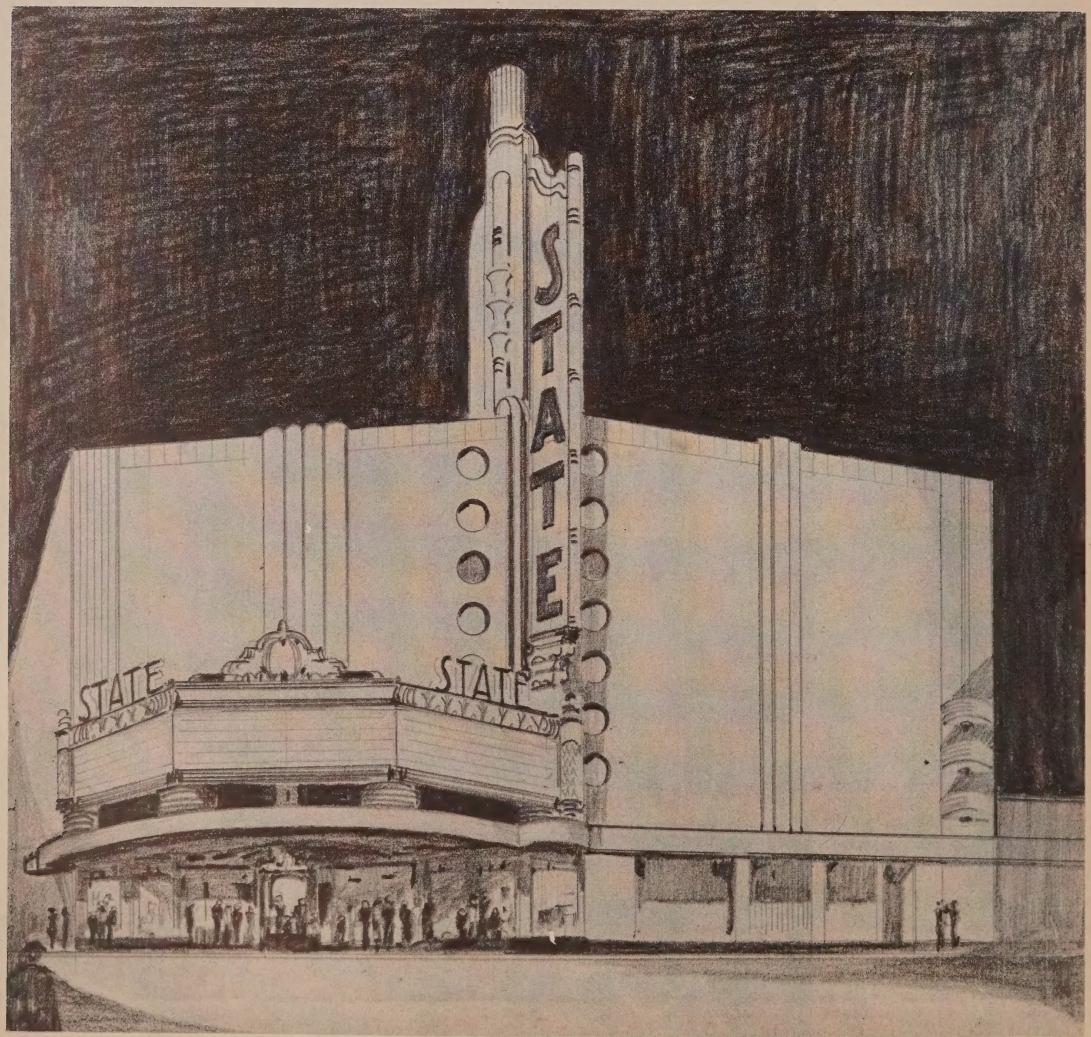


THE CONVENIENT ARRANGEMENT OF MANAGER'S OFFICE, CLOSET, AND UTILITY ROOMS; THE WELL BALANCED DECORATIVE POSSIBILITIES OF THE FOYER AND LOUNGE; AND THE LAVISH DISPLAY AND STORAGE SPACE OF THE CANDY BAR LOCATION CAN BEST BE NOTED FROM THIS FLOOR PLAN. ANOTHER POINT OF INTEREST IS THE WORKING IN OF A FLOWER AND PLANT BOX TO GIVE A PERMANENT DECORATIVE TOUCH TO THE THEATRE EXTERIOR.

ALEXANDER A. CANTIN
and
A. MACKENZIE CANTIN
Present

The State Theatre
Red Bluff, California

ADEQUATE SPACE, FOCUSED IN THREE DIRECTIONS, FOR CHANGEABLE LETTER SELLING COPY IS PROVIDED BY THE INTERESTING MARQUEE WHICH SEEMS TO SIT ON THE MORE SIMPLE CEILING OF THE OUTER LOBBY.



In northern California, approximately 100 miles north of Sacramento, this all-new theatre building is nearing completion as the replacement for another cinema which was recently destroyed by fire. On a lot 115 feet by 150 feet, the building is 65 feet by 150 feet, and due to the stadium floor plan, accommodates a total of 1,160 seats, plus one small store.

Because of the recent conflagration, no pains have been spared to make the building completely fire-proof. The walls are of reinforced concrete. A composition roof on 4 inches of insulation is laid over steel decking attached to steel trusses. The main floor is reinforced concrete on columns and girders with only the stadium section built of wood.

The building is fully air-conditioned with the same duct system and floor mushrooms used for the steam heat developed by oil burners during the winter.

Walls and ceiling of the auditorium are covered with acoustical plaster. A feature of the auditorium plan is a 40-foot-wide stage with 16 feet in depth to the front of the stage platform and an actual proscenium opening of 24 feet. Such a stage can not only supply good screen depth, but could accommodate many a flesh attraction or civic function which would add either financial or good-will benefits to the management.

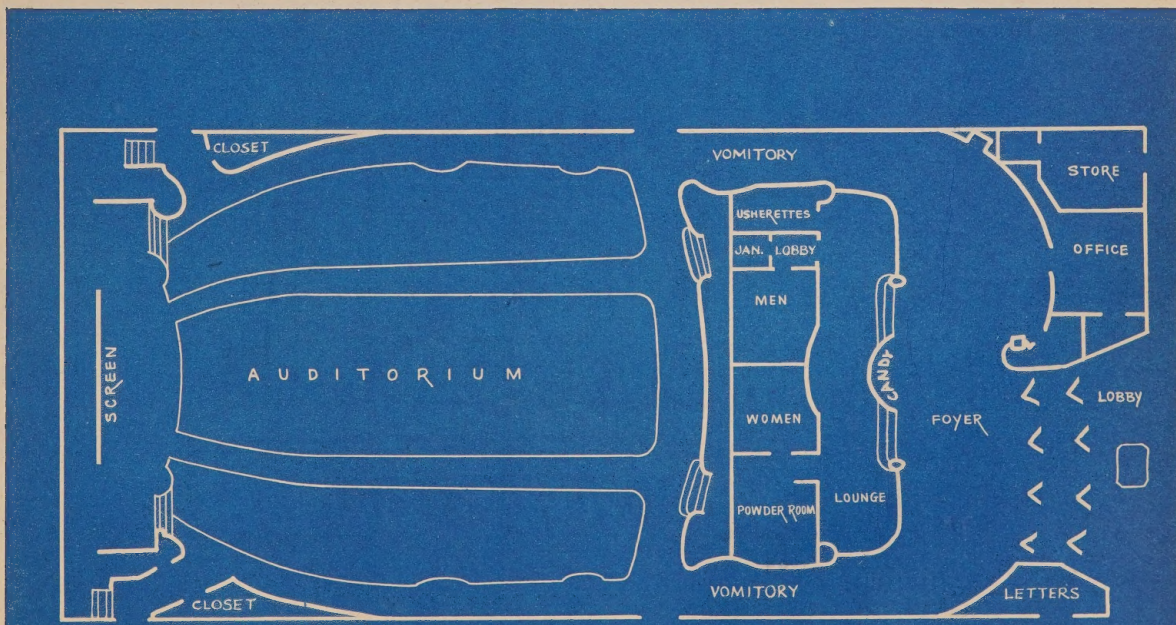
The facade is finished with cement stucco, and aside from an effective marquee, the central interest is directed to an ornate name pylon through the sheer simplicity of the floodlighted walls. Widely used in the sections of the country where climatic conditions permit, cement stucco can lend itself to any desired color combination through color actually mixed into the material or through painting at any time after thoroughly dry. It also permits a monolithic effect that is difficult to obtain with any material that must be erected in blocks.

An island box office is situated in the outer lobby, the floors of which are terrazzo with sinkage for ornamental rubber mats in the vestibule between it and the inner foyer. The walls and base of the outer lobby are colorful tile.

An open lounge surrounded by a wrought iron railing and elevated two steps above the central foyer furnishes an effective frame for the productive candy bar that cannot escape the attention of every entering patron. This elevated area also provides a luxurious decorative highlight which is certain to be realized on through the use of mirrors, lamps, and ornamental furniture.

The total volume of the building will be 330,000 cubic feet and the cost without ground is estimated to be $150,000.

SUFFICIENT EXITS AT EITHER SIDE OF THE STAGE AND TO BOTH SIDES OF THE THEATRE AT THE CROSS OVER AISLES, PERMIT THE ABANDONING, IN THIS PARTICULAR DESIGN, THE USUAL CENTRAL VOMITORY RAMP.



LEO F. ABRAMS

Presents

The Hampton Theatre

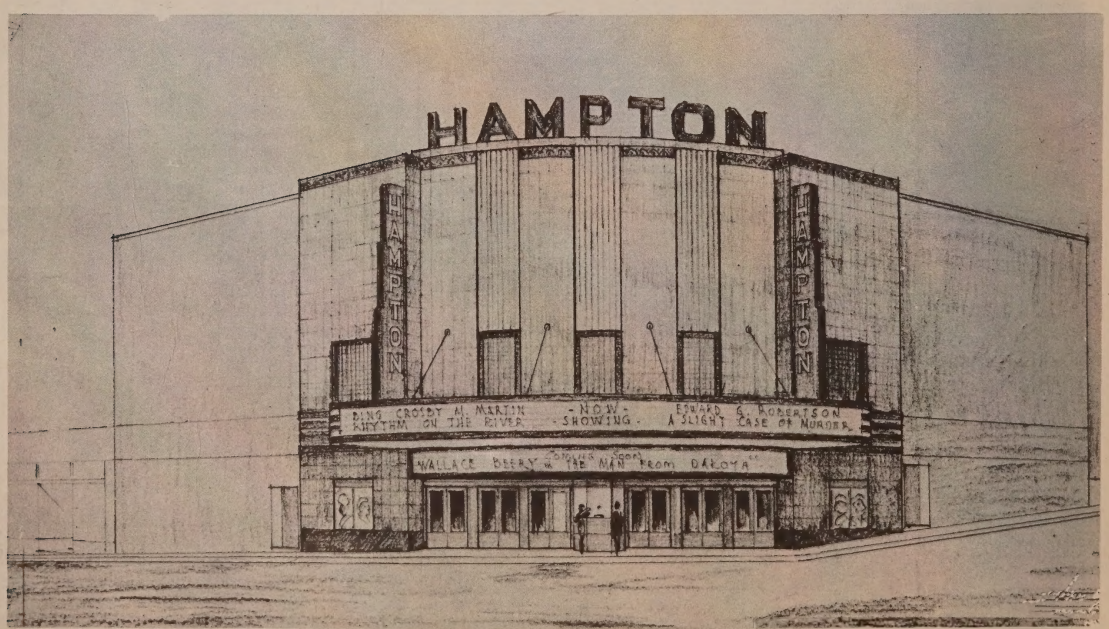
(Undisclosed Address)

Another interesting stadium type of floor plan, utilizing a three story effect over the lobby and lounge, is this modern theatre which is one of several to be constructed by this architect just as soon as manpower and materials are available in normal quantities.

The arrangement of the lobby and dome-ceilinged foyer, with a well-balanced plan of the rooms connecting off the latter, is worthy of careful study for possible adaptation in other situations.

While safety factors would seem to indicate that a shallow ramp would be a possible improvement over the stairs indicated in the main vomitory, this would require only a minor change in specifications. In every other way this theatre promises much and its final construction will be worth following.

THE FACADE SEEMS ORTHODOX EXCEPT FOR THE TWO SEEMINGLY SUPERFLUOUS UPRIGHT NAME SIGNS IN VIEW OF THE DRAMATIC ROOF NAME SIGN. APPLAUSE IS DUE, HOWEVER, FOR THE LETTER CAPACITY.



BALCONY PLAN

MEZZANINE PLAN

JOHN and DREW EBERSON

Present

The Mac Arthur Theatre

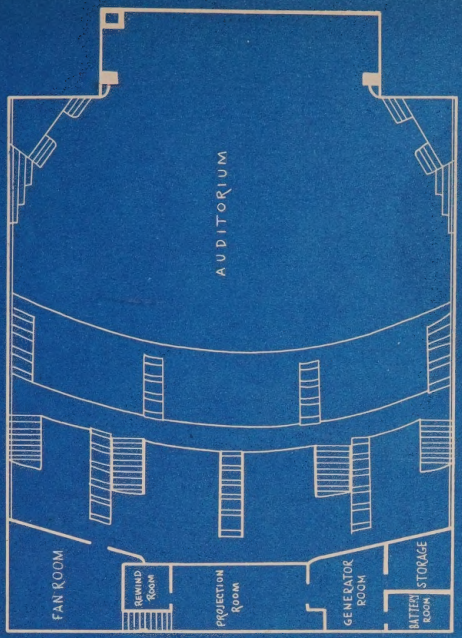
Washington, D. C.

This new Warner Brothers theatre, currently being constructed, presents a type of floor plan seldom encountered, for the orchestra is below the entrance lobby level, so the incoming patrons must descend one of two impressive grand staircases to gain the main floor. Following the contour of the ground, that, on the west side of the MacArthur Boulevard, falls sharply toward the Potomac River, the orchestra floor follows this slope and contains 660 widely-spaced comfortable chairs. Less than seven feet up from the lobby level, two other staircases lead to the compact and comfortable balcony; thereby creating a semi-stadium plan of slightly over a 1,000-seat total.

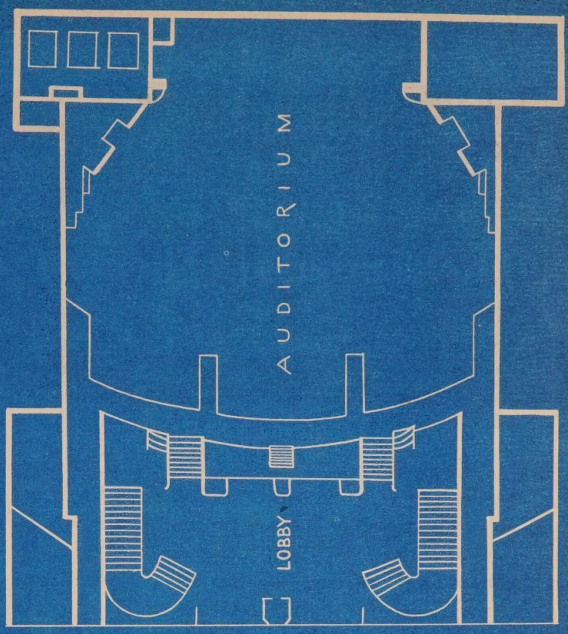
While ground contour dictated such a plan, its great advantage is a compact auditorium with the shortest possible distance from projection room to screen, thereby insuring good projection and sound.

As with its famous namesake, the insigne of five stars is the compelling decorative motif.

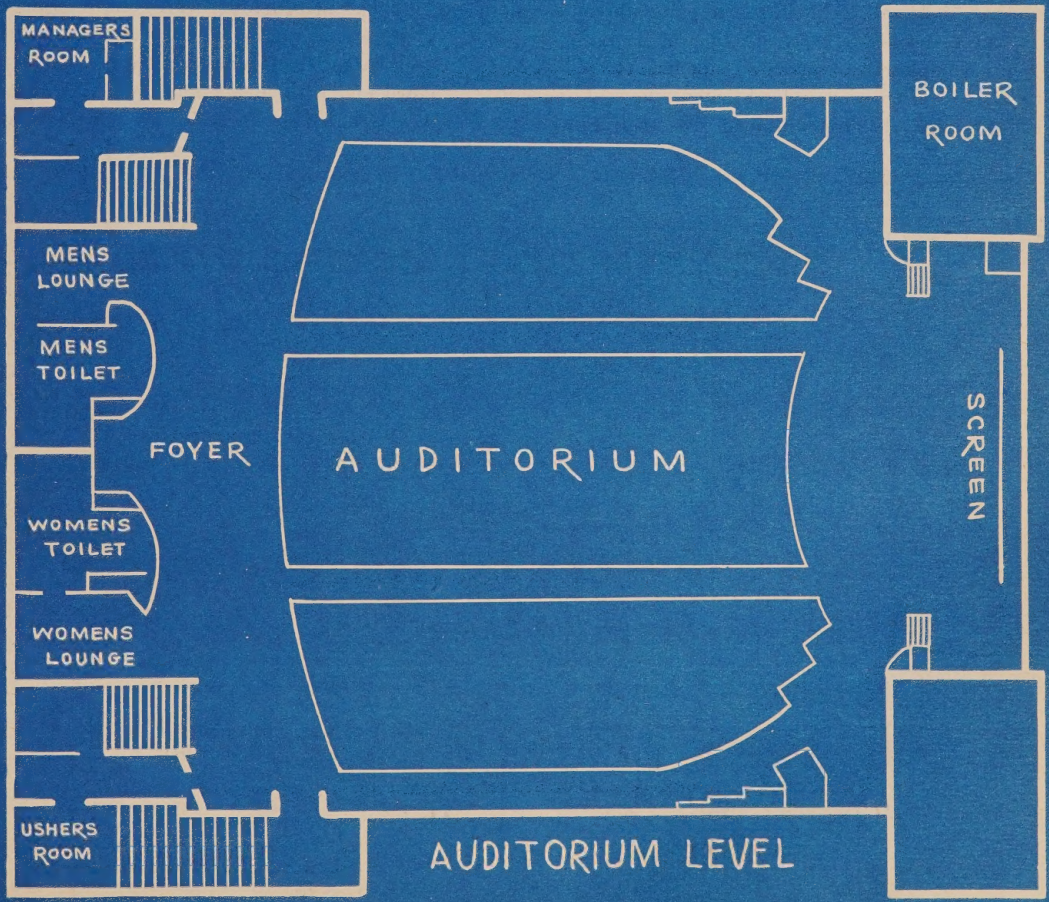
THE FRONT OF THE THEATRE IS AN ARCHITECTURAL STUDY IN WHITE STONE AND THE SHARP CONTRAST OF DEEP SHADOWS BROUGHT OUT BY INNOVATIONS IN FLUORESCENT LIGHTING. NOTE THE FIVE STARS.



BALCONY LEVEL



LOBBY LEVEL



AUDITORIUM LEVEL

JOHN and DREW EBERSON

Present

The Embassy Theatre

(FORMERLY MOZART THEATRE)

Washington, D. C.

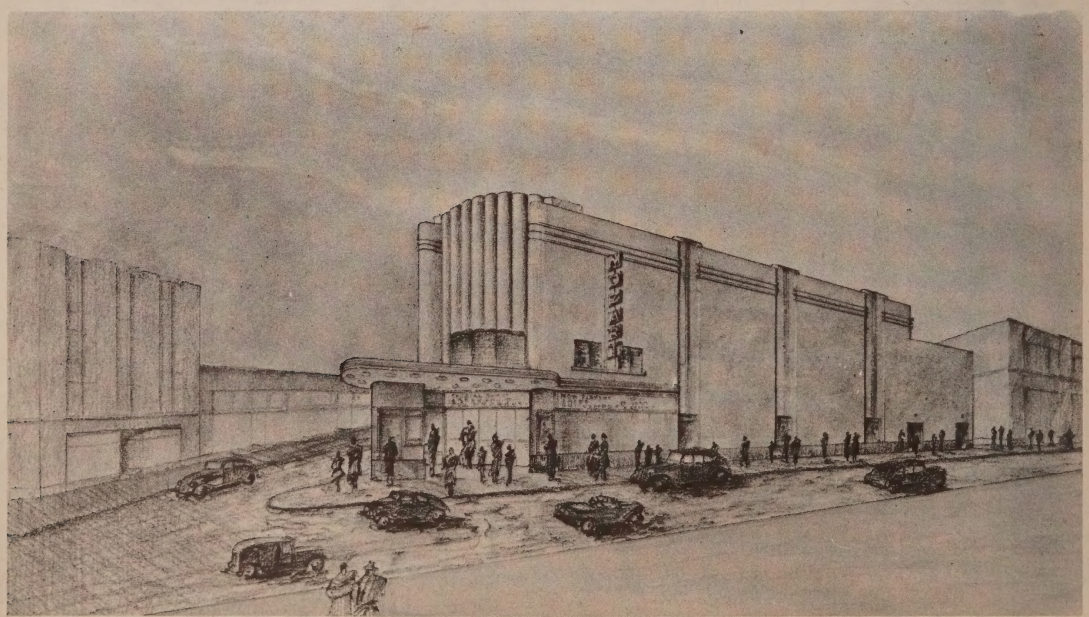
To be erected at the corner of Columbia Road and Mozart Place in the northwest section of the Nation's Capital, this theatre originally appeared in trade notices as the Mozart, but has been changed since to the Embassy. When erected, it will be the flagship of, and house the home offices of, the growing Valley Enterprises, Inc., independent circuit and provisions will be noted in the plans for the circuit offices, reached by a private stairway from the street.

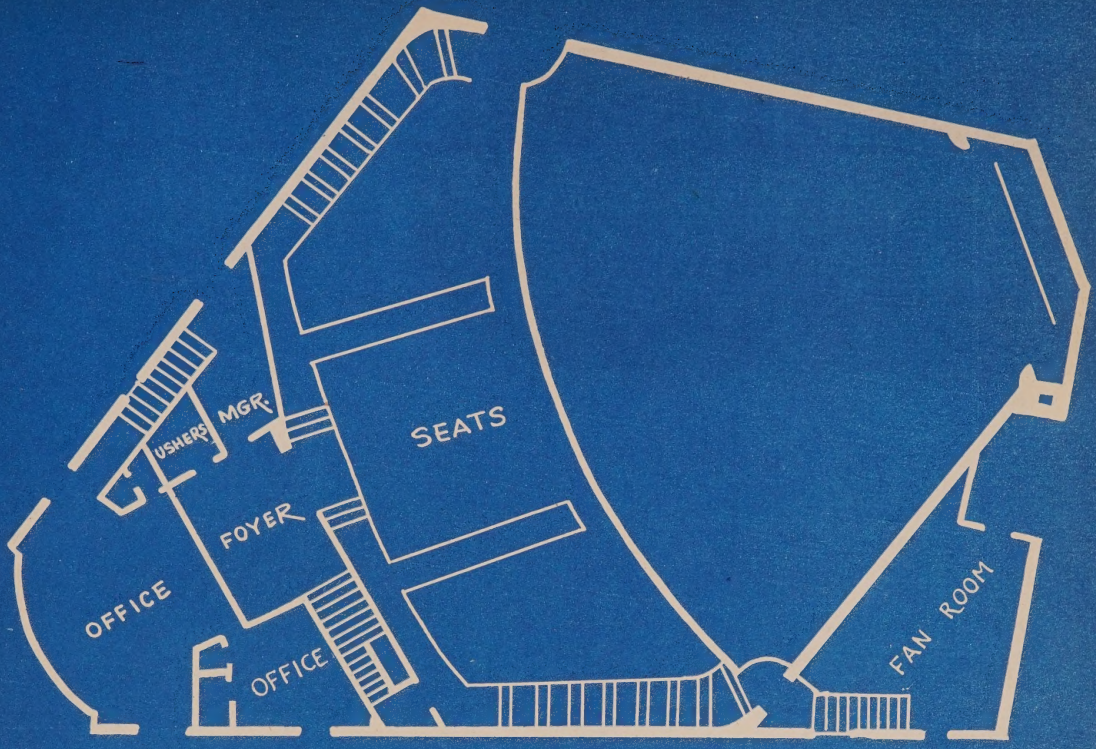
Completely fire-proof and modern to the last detail of construction and equipment, the building will be completely airconditioned. The seating capacity will be approximately 1,000, with 660 on the orchestra floor and 277 in the balcony. Wide spacing between seats and superior seating comfort will be one of the special features.

In keeping with the mode set by the federal buildings of that city, the front will be of stone in a design of dignity and simplicity. Being in Washington, the marquee will carry no program boards.

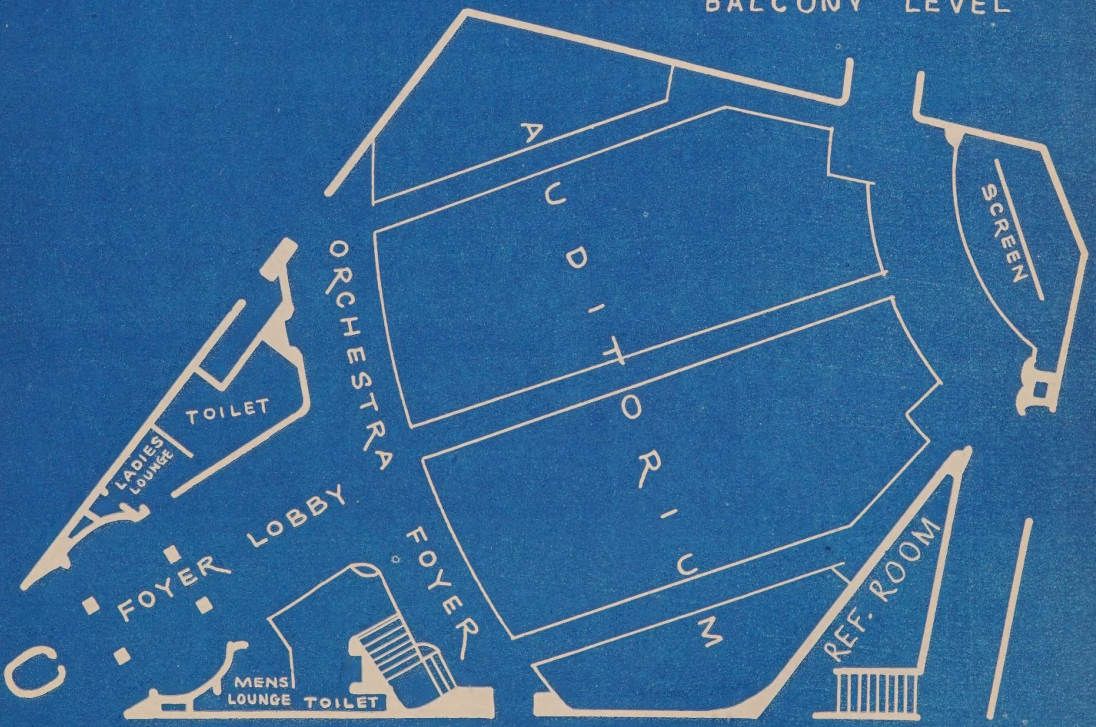
Of special interest is the manner in which such a well-balanced plan has been worked into an odd shaped plot with such a minimum loss of valuable space. Detailed specifications are now being written.

THE VERY SIMPLICITY OF THE ISLAND BOX OFFICE, PLAIN LETTERLESS MARQUEE, AND FLUTED COLUMNS OF THE FACADE, PRODUCE A DIGNITY AND QUALITY BACKGROUND THAT WILL ADMIRABLY FIT ITS LOCATION.





BALCONY LEVEL



ORCHESTRA FLOOR LEVEL

VINCENT G. RANEY

Presents

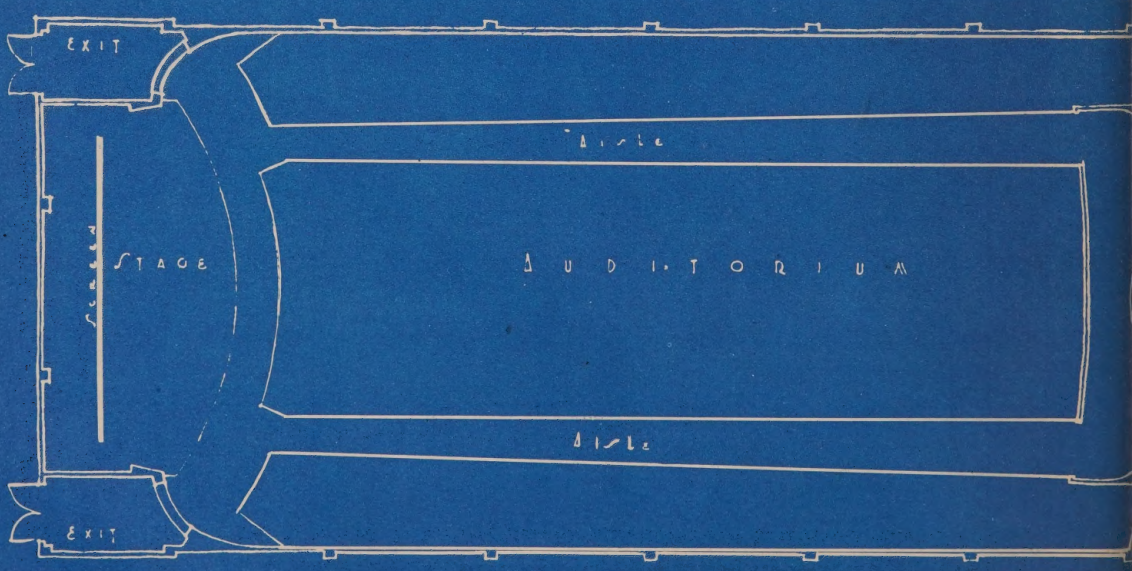
The Rodeo Theatre

Salinas, California

This community with a population of 12,000 is influenced principally by the patron standards of comfort and convenience found in neighboring San Francisco. On a lot that is 50 feet by 140 feet, this 650-seat, single-floor theatre is planned for the post-war period.

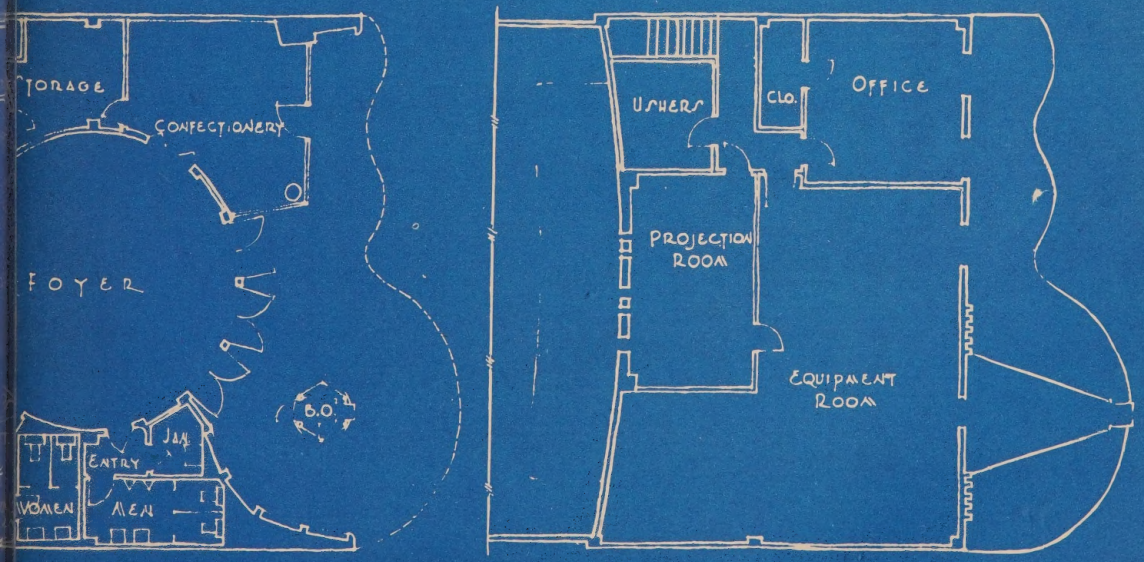
Again using a circular foyer with direct access to both street and auditorium, the two are tied together with simple functional planning. One of the outstanding features is the incorporation of a confectionary store into the theatre project. No candy counter this, but a big, full-sized store drawing patronage from the foyer through wide glass doors, and patronage from the street as well. While the plans do not indicate how the theatre patronage is kept separated from the non-admission paying general patronage, we suspect that a substantial counter or rail will divide the store. An ample storage room for use by the store permits a sweeping curved wall that will aid the foyer decoration. Designed into the theatre front and adding to the impressiveness of the facade, this confectionary store is flanked by theatre advertising locations and enjoys a marquee in common with the theatre. Even in a business district, where additional stores are not especially needed, such a project tied to the theatre, as here proposed, can generally be counted on to acquit itself very profitably for the operators.

THE SERVICE SUITE OVER THE FOYER PROVIDES AMPLE ACCOMMODATINOS FOR ALL OPERATING EQUIPMENT, THE MANAGER'S OFFICE AND EMPLOYE LOCKER ROOM. THE AUDITORIUM HAS ITS ACCENT ON THE STAGE.



..FIRST FLOOR PLAN..

THE MODERN FRONT OMITS THE USUAL VERTICAL SIGN BY INCLUDING THE THEATRE NAME IN A V-SHAPED CHANGEABLE LETTER ATTRACTION BOARD WHICH HAS BEEN WORKED INTO THE CIRCULAR MARQUEE. NOTE HOW THE MARQUEE AND TRIM CARRIES THE THEATRE FEELING TO THE ATTRACTION BOARD AT THE RIGHT.



..SECOND FLOOR PLAN..

KAPLAN and SPRACHMAN

Present

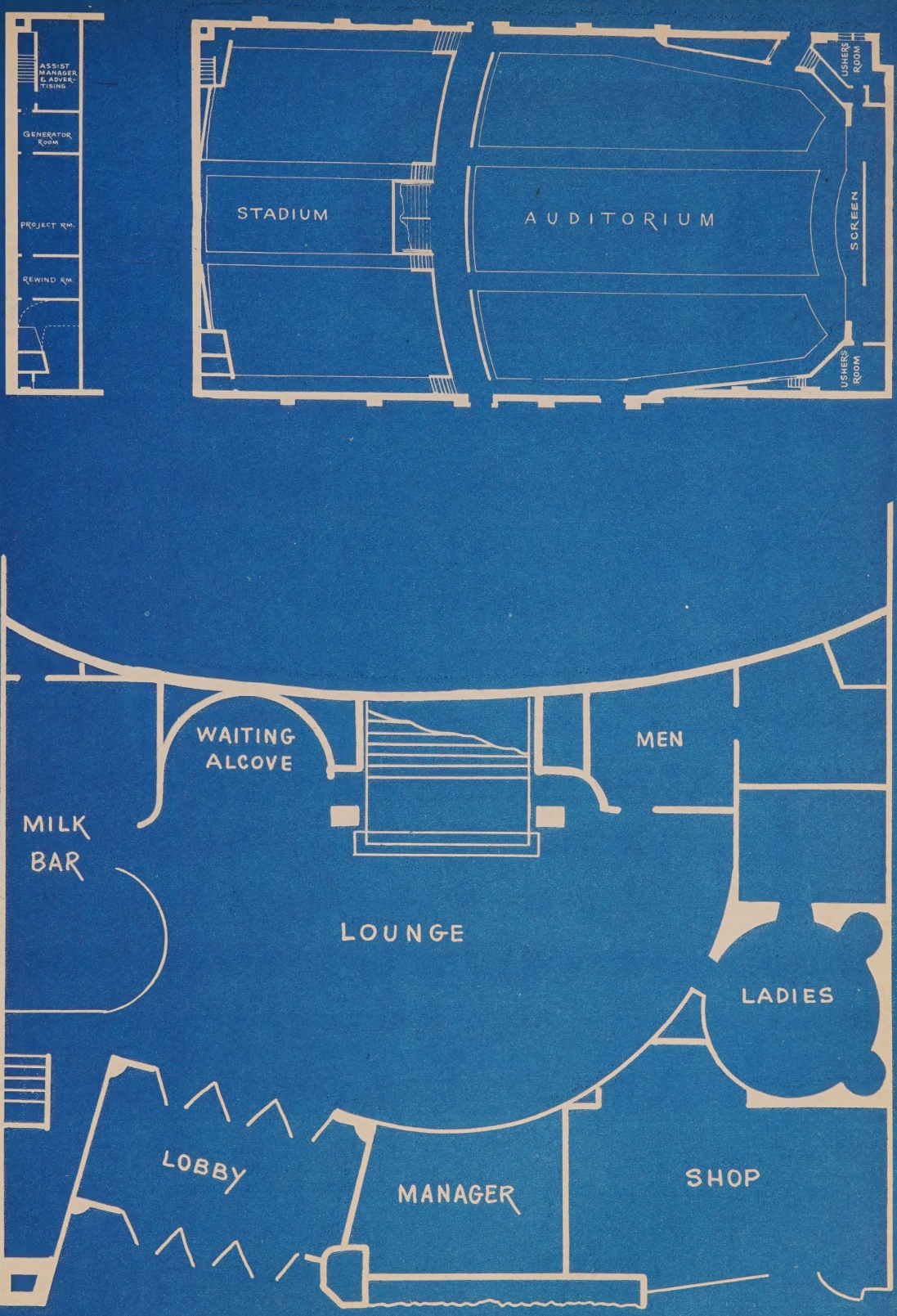
The Paramount Theatre

Saint John, New Brunswick

As the largest theatre in this city where there has been no new theatre building for many years, great effort will be directed toward making the new Paramount an outstanding example of modern luxury. To be constructed on a lot 93 feet by 145 feet, with a contents of 450,000 cubic feet and costing $250,000, a stadium plan has permitted accent on a spacious lounge that will lend itself to rich decoration, without sacrificing seating capacity in the auditorium. The total seating capacity will be 1,452, with 852 seats spaced 31 inches back-to-back on the main floor, and 600 seats spaced 32 inches back-to-back on the stadium floor. Structural glass doors at the lobby entrance will introduce the interior richness to the passersby.

Foundation and floors will be reinforced concrete. Walls will be of brick with a back-up of tile. The roof will be of gypsum roof slab overlaid with felt and gravel, and supported by steel trusses. Heating will be by forced hot water; and air-conditioning by refrigeration. The acoustical treatment will combine Acousti-Celotex and rockwool.

ONE SMALL STORE HAS BEEN WORKED INTO THE FRONT WHICH WILL BE CONSTRUCTED OF BUFF AND BROWN BRICKS, WITH A PORTION COVERED WITH STRUCTURAL GLASS TO RESULT IN A PLEASING DESIGN.

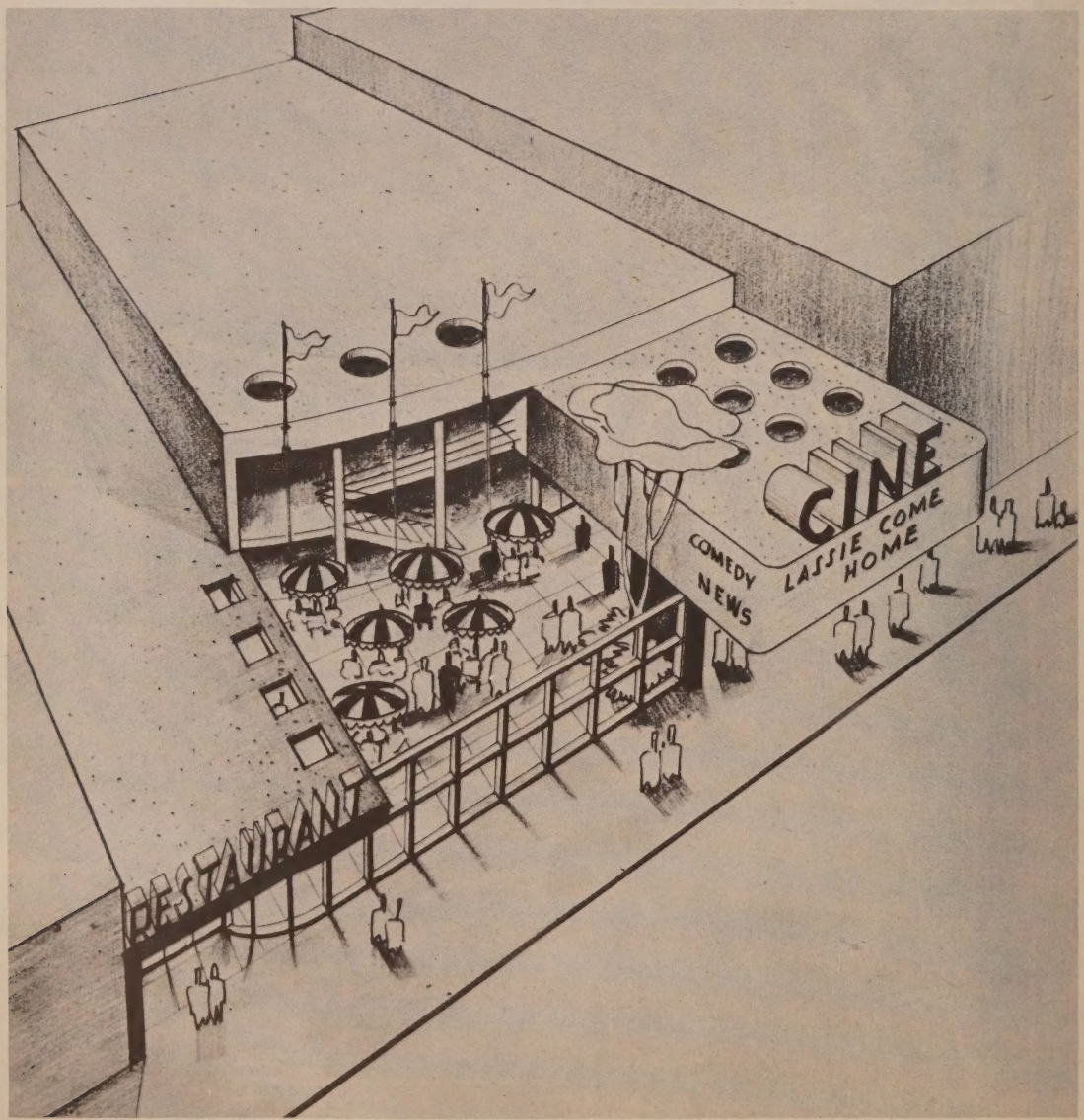

ASSIST MANAGER & ADVERTISING
GENERATOR ROOM
PROJECT RM.
REWIND RM.
STADIUM
AUDITORIUM
USHERS ROOM
SCREEN
USHERS ROOM
WAITING ALCOVE
MEN
MILK BAR
LOUNGE
LADIES
LOBBY
MANAGER
SHOP

CLARENCE KIVETT
and RALPH E. MYERS

Present

The Cine Theatre
(Undisclosed Address)

WHILE THE MAIN RESTAURANT IS UNDER ROOF AND PROTECTED FROM THE WEATHER, THE SMALL OPEN DINING TERRACE PROVIDES BOTH THE RESTAURANT AND THE THEATRE LOBBY AND LOUNGE WITH AN OPEN AND INTERESTING EFFECT. THE CANOPY SIGN EXTENDING OVER THE SIDEWALK WILL BE SERVICED FROM THE INSIDE, WHERE ADEQUATE STORAGE BINS FOR THE CHANGEABLE LETTERS THEMSELVES WILL BE AVAILABLE. COLORFUL AWNINGS OF A ROLL-BACK TYPE COULD BE PLACED OVER THE TERRACE AREA TO PROTECT AGAINST DIRECT SUNLIGHT; JUST AS ADDITIONAL POTTED PLANTS COULD MAKE IT MORE PRIVATE. IN NORTHERN LOCATIONS, A LIGHTED CHRISTMAS TREE OR OTHER SEASONAL DECORATION CAN TEST THE ORIGINALITY OF THE MANAGEMENT



A very original departure from orthodox theatre planning, and one which presents many new ideas of considerable merit, is this startlingly unusual project.

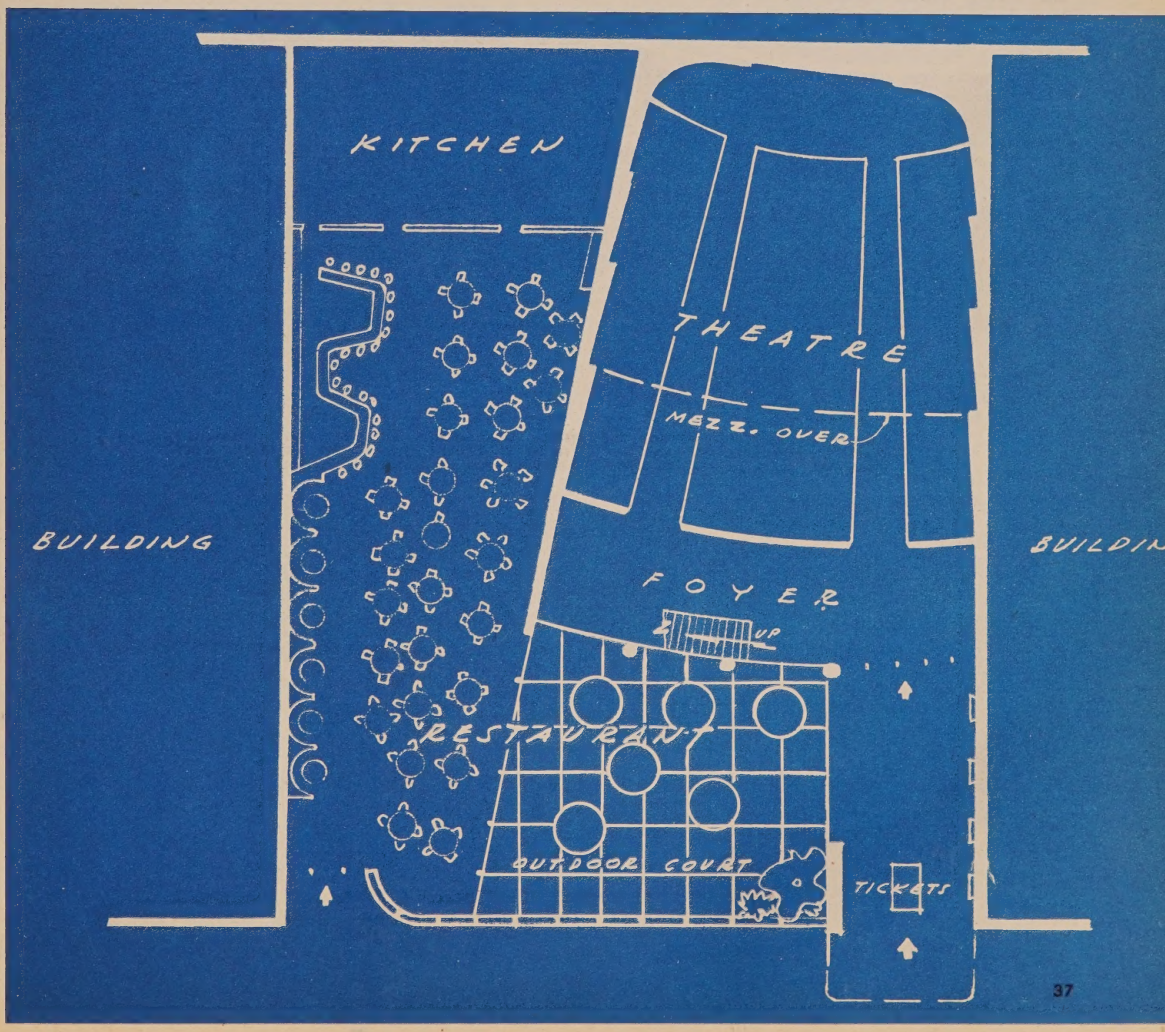
Here the site is restricted by buildings on both sides but has an unusual depth that would require a long and necessarily dull lobby. As a result, the attempt is made to use all of the available space to the best advantage by keeping the front area open so that both the theatre and the adjoining restaurant may mutually benefit. Through such open planning, a pleasing effect can be made desirable to both projects with a maximum service to the public.

As theatre owners are becoming more conscious daily of the profit and patron-pleasing benefits to be derived from candy counters, milk bars, and other vending methods which tie entertainment to "a bite to eat," such combined ventures are certain to become more common. The basic open plan has already been proved successful by the stores and restaurants that abut the skating rink in New York's Radio City and by numerous other amusement enterprises elsewhere. Through it, the appeal to the public is manifold rather than the single magnet of a few hours looking at a picture.

In less crowded sites, and as a unit in itself at a seashore, mountain, or other resort where the view from the dining terrace may rival the pictures on the screen, such a plan has even wider possibilities.

This planned structure will be of steel, concrete, and glass, all so placed for the maximum utility and ease of maintenance.

FITTING "LIKE A GLOVE" INTO AN IRREGULAR PARTICIPATION IN THE AVAILABLE PLOT, THE TWO PROJECTS ARE DEPENDENT ON, AND HELPED BY, EACH OTHER. UNDER GOOD MANAGEMENT BOTH MUST BENEFIT.



RUSSELL GOODWIN LARKE

Presents

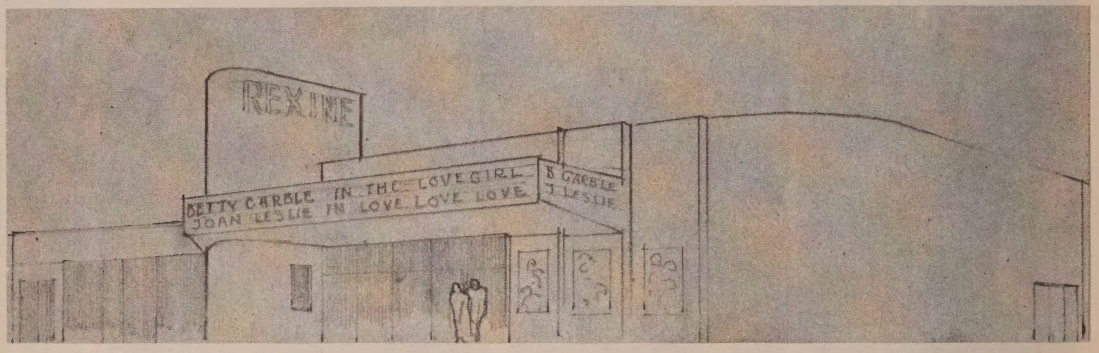
The Hintern Theatre

(Undisclosed Address)

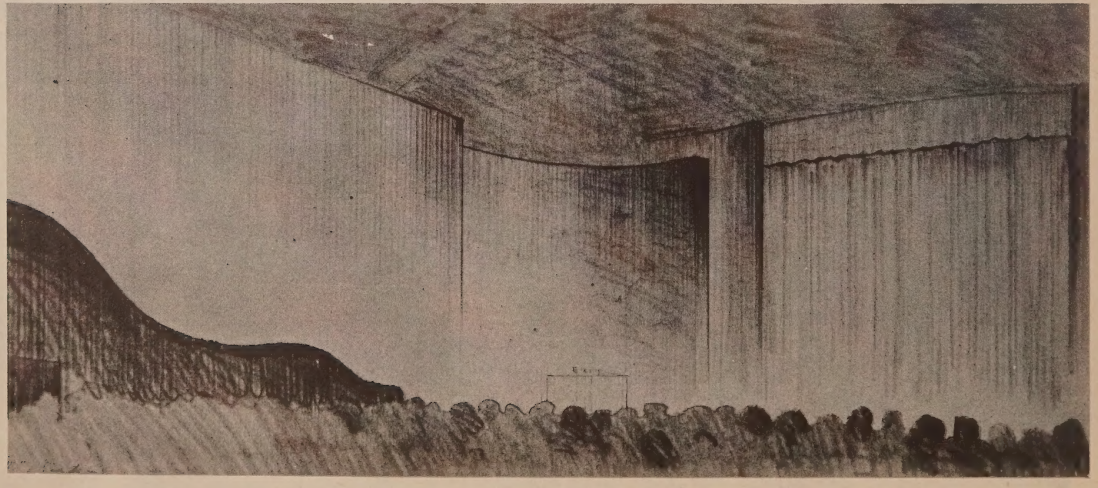
The problem of a rectangular lot 110 feet by 89 feet has been faced very originally and successfully with the creation of this plan for an 808-seat theatre, complete with the orthodox lounge and service rooms, plus one adequate store.

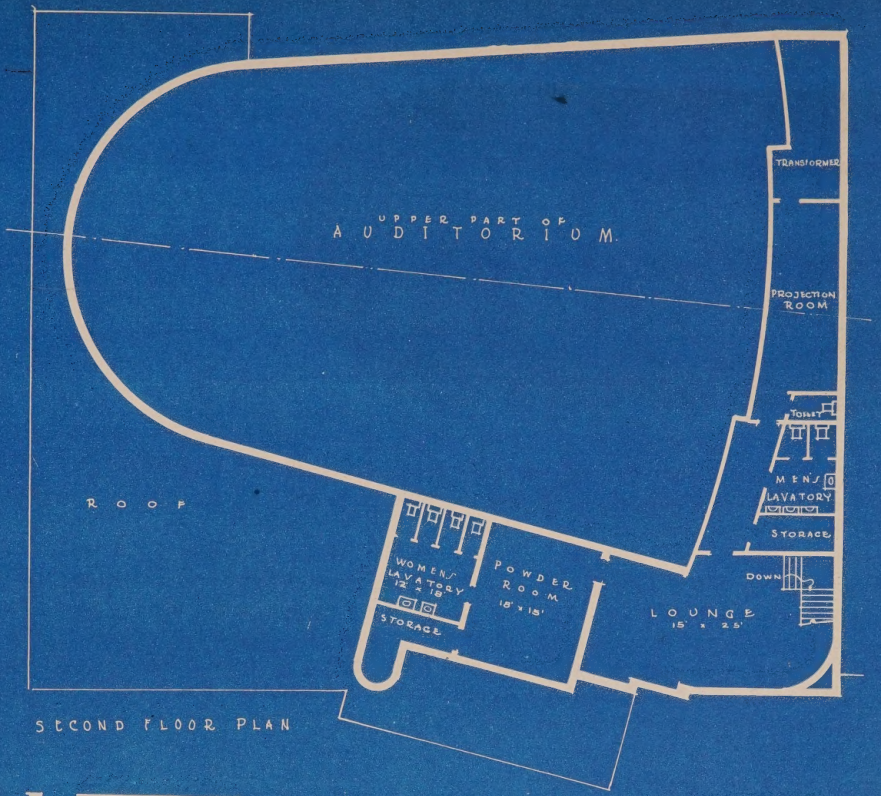
To be constructed in northern latitudes, noted for severe winter weather, the main box office is situated inside of the lobby. When desired, however, a display panel may be removed and a second or outer box office put into service. The number and location of other display panels will provide exceptional advertising areas.

Of note also are the location, size, and storage facilities of the candy counter framed by the grand staircase to the lounge. And the spacious luxury and privacy of the lounge itself and its adjoining rooms.

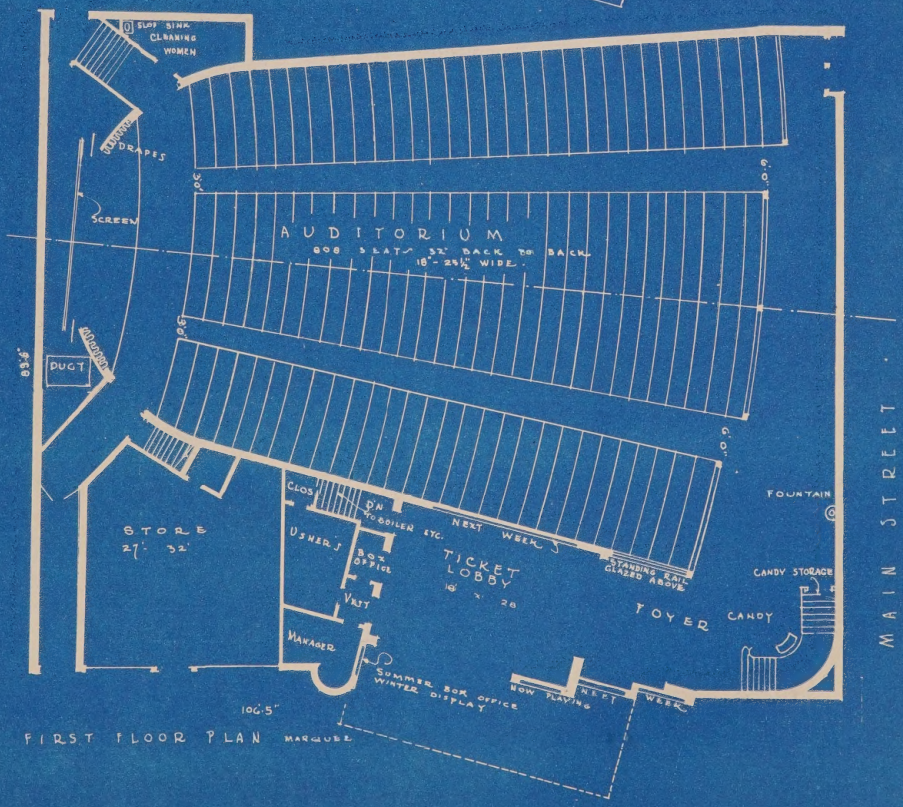


SIMPLICITY IS THE KEYNOTE OF BOTH THE EXTERIOR AND INTERIOR, WITH THE GREATEST EMPHASIS PLACED ON PATRON COMFORT AND EASE OF FUTURE MAINTENANCE. ALL INDIRECT LIGHTING, HEAVILY UPHOLSTERED SEATS, SUMMER AND WINTER AIR-CONDITIONING ARE INDICATIVE OF MODERN OPERATION.





SECOND FLOOR PLAN



FIRST FLOOR PLAN

RUSSELL GOODWIN LARKE

Presents

The Roc Theatre

Undisclosed Address

An interesting conception of one manner in which stores can be worked into a rectangular lot without the old-fashioned, long, and often dull lobby is this proposed theatre with 998 seats on one floor. With the main street on the long side of a lot 159 feet wide by 126 feet deep, and with the drawing area to the left, a plan at right angles to the street would have resulted in many less seats, a relatively skimpy lobby and foyer, and the need to build higher in order to accommodate the lounge and rest rooms on a second floor plan. This latter plan would also have produced stores of inordinate depth or actual wasted lot area. That the actual plan is far superior and has permitted an accent on spacious foyer and utility rooms is obvious.

Designed for a northern state, where severe weather makes an inside box office and a protected ticket lobby advantageous, a series of sweeping curves directs traffic through a series of structural glass doors, through the foyer and into the main auditorium.

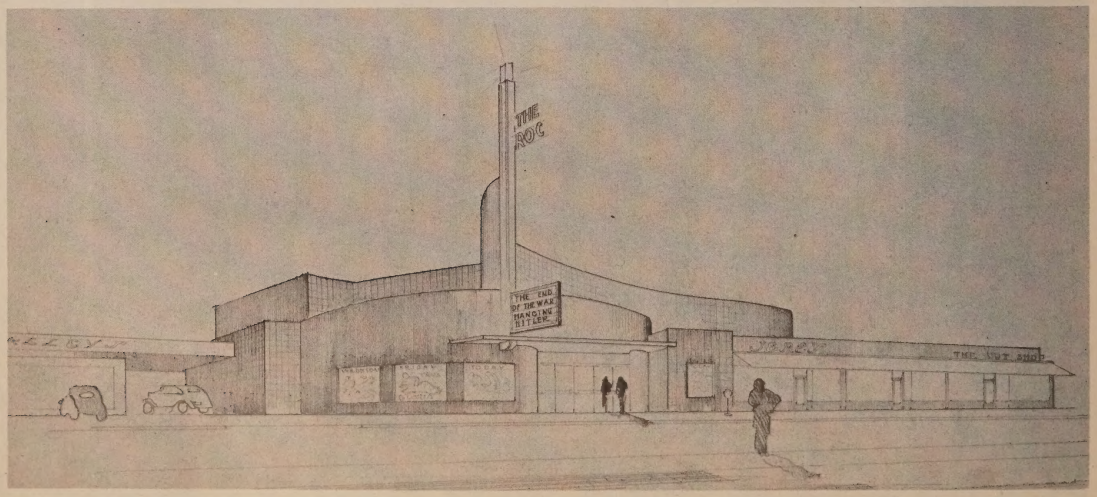
A mother's room, elevated over the heads of the standees and with a heavy glass view window and monitor speaker, makes it possible for her to enjoy a matinee while her children play in the nursery.

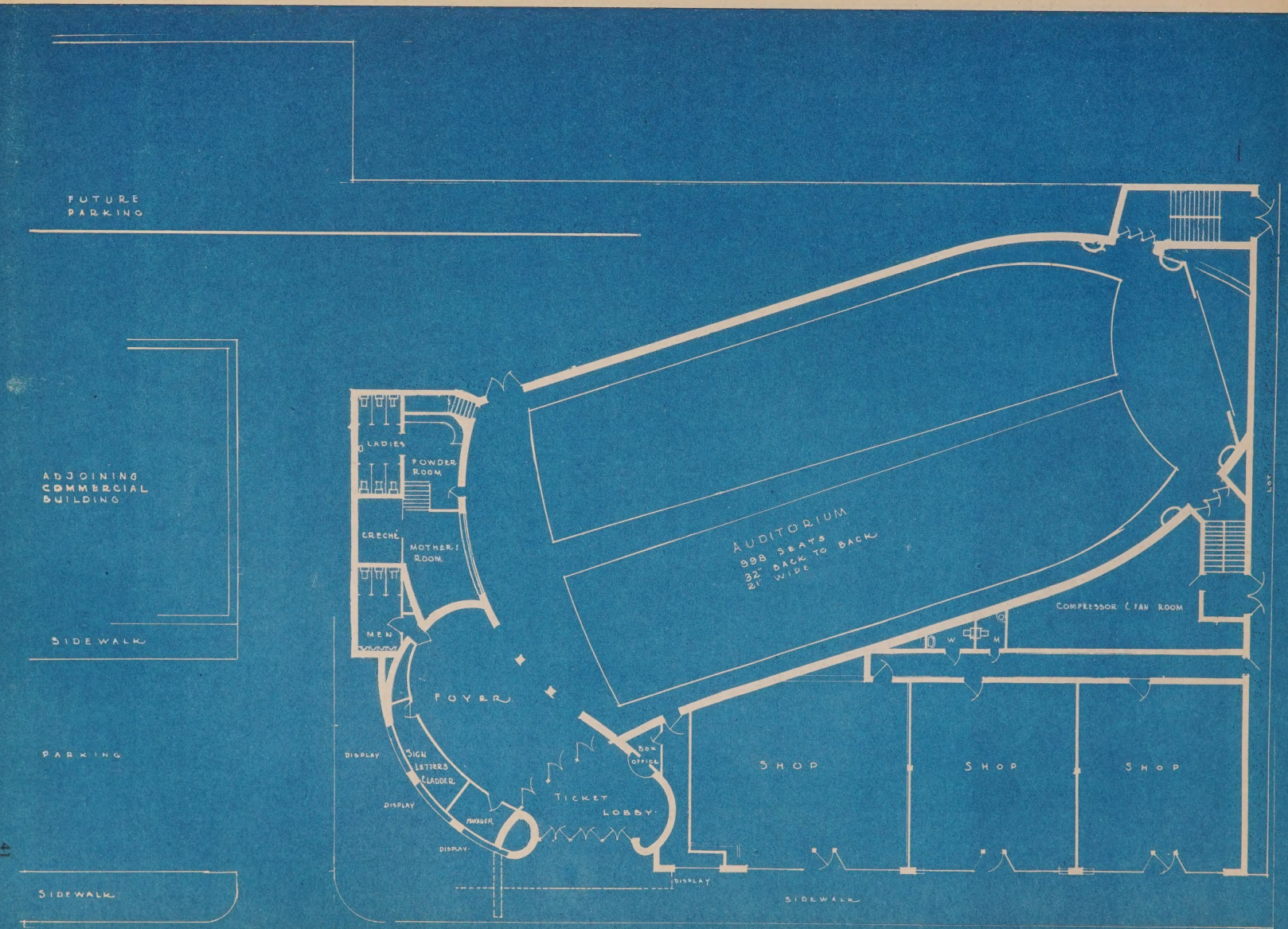
A storage room for ladders and sign letters, close to the marquee and easily accessible, is worked into the double wall of the facia.

The stores have their own back passage complete with their own toilet facilities that are so often overlooked.

Out front, the same sweeping curve sets the motif that makes most effective the projecting changeable letter sign and lighted name pylon. Display boards for current and future attractions are recessed and shadow-lighted in the curved surface. A simple, neon-lighted coping serves as a suggestion of, rather than an actual, marquee.

PARKING FACILITIES, WHICH BECOME MORE AND MORE A MODERN THEATRE MANAGEMENT PROBLEM, ARE HERE GIVEN DUE CONSIDERATION, BOTH ACROSS A SMALL STREET AND AT THE REAR OF THE THEATRE PLOT.




FUTURE PARKING
ADJOINING COMMERCIAL BUILDING
SIDEWALK
PARKING
SIDEWALK
LADIES
POWDER ROOM
CRECHE
MOTHER'S ROOM
MEN
FOYER
DISPLAY
SIGN LETTERS CLADDER
DISPLAY
PAYAGER
DISPLAY
TICKET LOBBY
BOX OFFICE
DISPLAY
AUDITORIUM
998 SEATS
32' BACK TO BACK
21' WIDE
COMPRESSOR & FAN ROOM
W
M
SHOP
SHOP
SHOP
SIDEWALK
LOT

W. H. LEE

Presents

The Green Hill Theatre

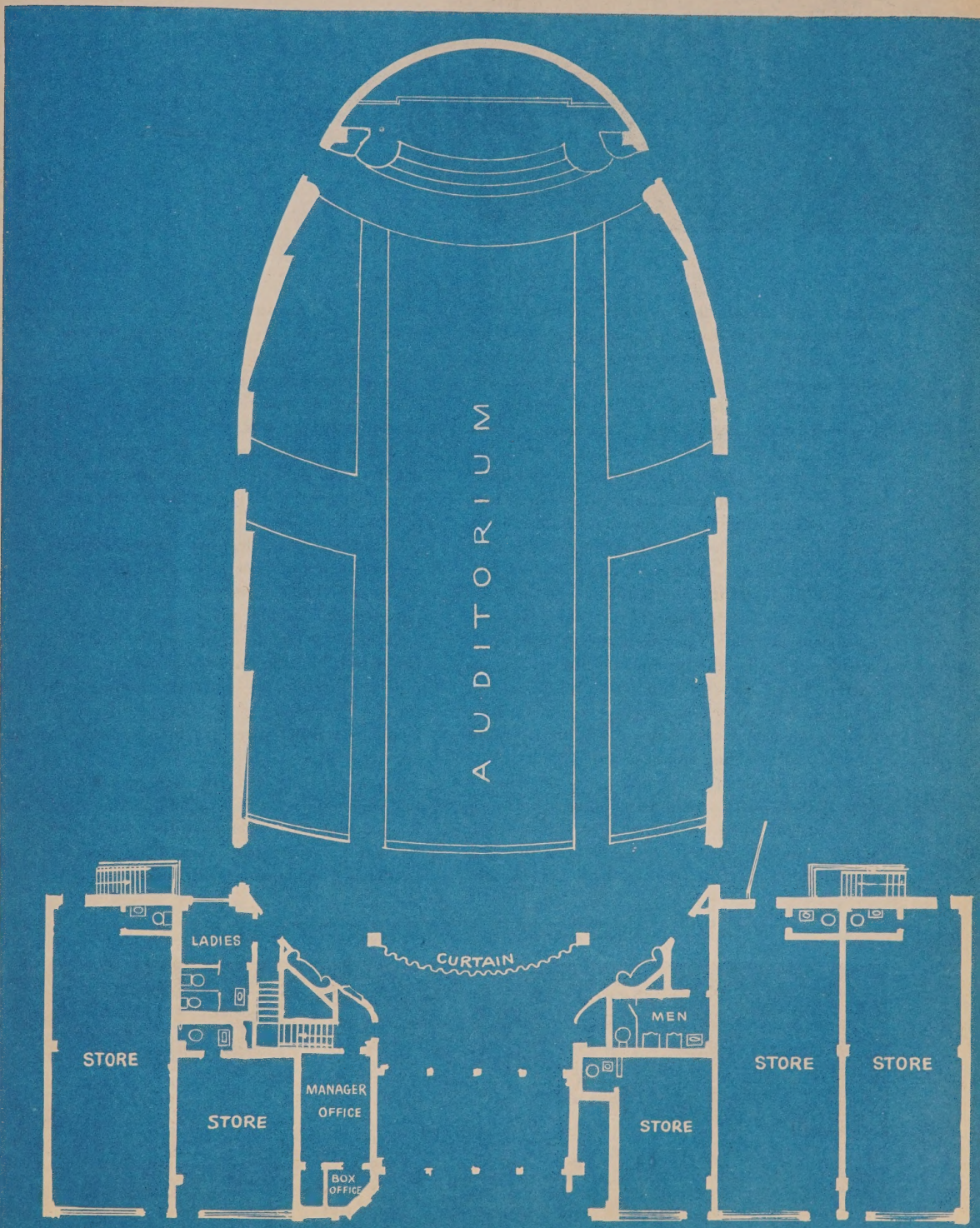
Philadelphia, Penna.

On the western fringe of the Philadelphia city limits, and the first community at the bottom of the famous "Main Line" section of suburban homes, this 750-seat theatre is being constructed by neighborhood interests to serve a high-type clientele which demands conservatively good taste instead of extreme theatricalism. An irregular lot 120 feet by 155 feet and verging on the triangular was readily adaptable to a theatre plan that would permit an adequate lobby and foyer plus the addition of five stores along the main street which is the heavily traveled Lincoln Highway to the West. Sufficient ground was available to permit an auditorium shaped to create ideal conditions for sound, sight and atmosphere, and still provide adequate parking facilities adjacent to it and on the less desirable areas at the rear. The theatre portion of the building will have a content of 155,000 cubic feet. In compliance with the city's building codes, the theatre will be completely fireproof and possess six emergency exits in addition to the main doors. Above the masonry foundations and concrete slab floor, the walls will be of double-thick brick. The two tones of face brick used on the front will be further enhanced by the use of glass, porcelain, and stainless steel. An orthodox marquee will provide sufficient changeable letter selling space for the use of large size letters to attract the passing motorist.

Because the entrance doors will be lined up immediately in front of the screen, a motorized curtain at the rear of the standee area will eliminate daylight flashes on the screen during matinee performances. The manager's office and box office communicate, thereby facilitating the handling of receipts and tickets, and providing greater protection for the cashier and her cash.

IN A NORMALLY DIMLY LIGHTED AREA, IT BECOMES THIS THEATRE'S DUTY TO PRESENT A BRIGHT SPOT WHICH WILL ATTRACT PATRONAGE TO IT AND TO ITS STORE BLOCK, AS IS ACHIEVED HERE.

THE STAGE END, ROUNDED AND CLASSIC IN DESIGN, ADOPTS THE AMPHITHEATRE PLAN WITH ITS CURVED PLATFORM APPROACHED BY BROAD STEPS. THE BUILT-IN BENCHES WILL PROVIDE THE ONLY FOYER FURNITURE AND, WITH THE CURTAIN OPENED WIDE, THE STANDEE AREA MAY REACH LITERALLY TO THE SIDEWALK.



W. H. LEE

Presents

The Strand Theatre

Wildwood, New Jersey

As one of the larger summer resorts of the southern New Jersey ocean front, the population of Wildwood during the three other seasons of the year could not possibly support a modern, first-run, fireproof theatre of this size. Therefore, the entire investment must be supported by its summer operation only, and, as it is located on the boardwalk, the eleven shops are an important adjunct to the financial success of the project. Designed for maximum income at a minimum cost consistent with modern construction, this theatre seats 1,600 on one floor with a total cubical content of only 400,000 feet. The over-all size of the plot is 151 feet by 191 feet.

By creating an air chamber in the outside walls as a means of weather-proofing, the decoration on the interior walls will be applied directly on the concrete block thereby eliminating all plaster or fabric. As such block has some sound absorption qualities, the acoustical treatment will, therefore, be confined to the ceiling and rear walls.

Another structural economy is the locating of the projection booth over the rear third of the auditorium instead of at the normal rear, substantially reducing the cubical contents of the structure and of the auditorium. The resultant high ceiling at the stage will be glamourized by the proscenium-draping treatment, while the low ceiling at the rear forms the top of the sandee breaker rail. The savings that can be effected in construction costs, projection throw, and air-conditioning and heating equipment capacities are obvious.

Glass entrance doors will be used without the possibility of daylight flashes on the screen, because the entrance is on the end of the standee area, rather than at the usual center.

The booth portholes barely below the ceiling line are adjusted by a series of three ceiling steps at either side that will be worked into the decoration, lighting, and air-duct plan.

The 22-foot depth of the standee area across the full back of the auditorium—permitting access to all toilet and rest rooms—not only eliminates the need for the normal foyer or lounge, but provides tremendous waiting space for the expected week-end crowds.

A simple but brightly lighted marquee dominates the block, and a neon-lighted canopy with flush downlights, together with a brightly colored terrazzo pavement trim, carries the theatre's lobby treatment from one end to the other.

THE ALL-GLASS TOP OF THE ISLAND BOX OFFICE, COMPLETE WITH THE STRUCTURAL GLASS DOORS TO THE INNER VESTIBULE, FURNISHES GOOD OBSERVATION AND TRAFFIC CONTROL DURING PERIODS OF PEAK LOAD.

EXIT
SCREEN
EXIT
AUDITORIUM
SHOPS
TICKETS
VESTIBULE
FOYER
OFFICE
JANITOR
MEN
WOMEN

LUKE and LITTLE

Present

The St. Laurent Theatre

Montreal, Canada

Down from Canada has come this 550-seat theatre to be built in a suburban area of Montreal. According to specifications the walls are to be of concrete block faced with brick, and in certain portions of the front, with Vitrolite structural glass.

A glass-enclosed, visual lobby will be lined with knotty pine in a warm, rich finish. The auditorium will be simple and practical with a painted Masonite dado above which the walls and ceiling will be lined with a Celotex-type fiberboard.

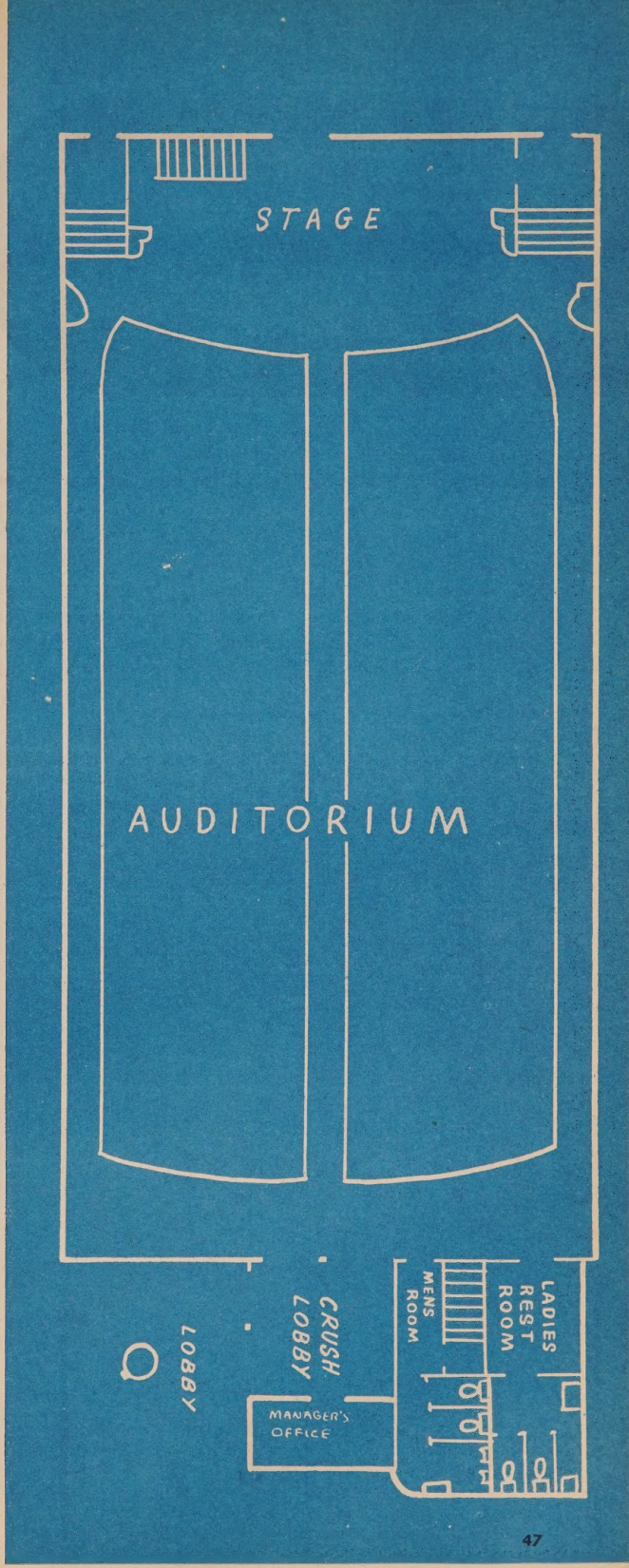
WHILE ONLY ONE COUNTERSUNK AND SHADOW-LIGHTED DISPLAY IS AVAILABLE AT THE RIGHT FRONT, STANDEES, CUT OUTS, AND SIMILAR MATERIAL CAN BE EFFECTIVELY LIGHTED INSIDE OF THE ALL-GLASS LOBBY.

The hot-air heater and air-conditioning unit will be located in a basement under the stage, with the conditioned air delivered into the auditorium through ceiling Anemostats. For the front portion of the house—that is, the lobby, washrooms, manager's office, projection room, and so forth—a hot-water heater in a separate basement under the lobby will be used.

An outstanding feature of the auditorium is a 34-foot wide and 13-foot deep stage with a 29-foot proscenium opening. This stage will be equipped with panel board, border and foot lights, and the like, sufficient to run occasional flesh performances.

Such economically and tastefully built small theatres are a pleasure to inspect, for they reflect the type of operation that is the backbone of show business. For invested dollar, their income return is often greater than that of the de luxe palace; and through their smaller auditoriums a greater mass of the public is each year served with entertainment.

The future construction of this theatre will be followed with interest.



A CEILING-LIGHTED LOBBY, WITH A TERRAZZO TILE FLOOR, IS COMPLETELY ENCLOSED IN CURVED GLASS TO GIVE THE NECESSARY PROTECTION WITHOUT GIVING THE EFFECT OF A CLOSED LOBBY. THE ISLAND BOX OFFICE IS CIRCULAR IN SHAPE. TOP-LIGHTED POSTER FRAMES ALONG THE SOLID WALL CAN BE SEEN FROM THE STREET. IN THE INNER FOYER THE SAME TREATMENT AS THAT SO EFFECTIVELY USED IN THE OUTER LOBBY IS EMPLOYED.

VINCENT G. RANEY

Presents

The El Rey Theatre

Wasco, California

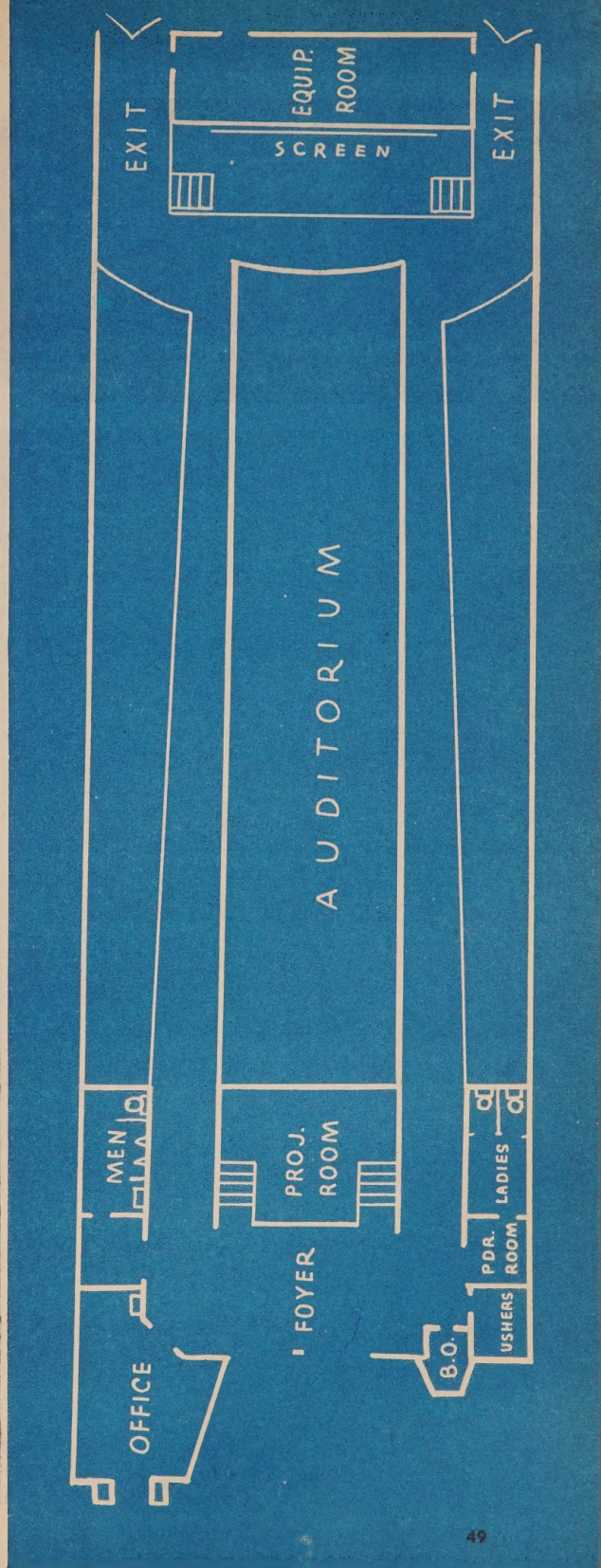
For a rural community of 4,000 population, this 400-seat theatre will be set back from the street and located in a residential neighborhood on a lot that is 40 feet by 150 feet. Economy, consistent with modern comfort, is the keynote and construction will be of wood frame and stucco. To save the cubical contents of a high ceiling, the projection room is situated on the first floor between the aisle heads in much the usual manner of a studio or exchange screening room, with entrance doors off the foyer.

The depth of lot permits a small stage platform which might be well used for home-talent performance or local events; and the placement of heating and air-conditioning equipment in the area back of the stage, easily accessible for service and fuel from the rear street. No actual building area is wasted, as can be noted from the position of the small ladies' and men's rooms, and the manager's office. The marquee canopy is hung from the structure and supported by two pipe supports at the outer edge without giving other than a modern impression.

And, again to practice the maximum economy, the upright sign and attraction board is independently constructed in much the manner of an outdoor poster sign.

While the construction materials might not be practical in more severe climates, there is much to be learned from this plan by the builder in a small or uncertain community where economy in first cost must be important.

THE INCORPORATION OF LIVE GREENERY AGAINST THE STUCCO PLAINNESS CAN ALWAYS PRODUCE A PLEASING RESULT. NOTE THE RESTRAINT IN USING AN ORNAMENTAL GLASS PANEL AT THE LEFT OF THE FACADE WHERE AN INDEPENDENT POSTER UNIT WAS INSTALLED BECAUSE IT WAS THOUGHT DESIRABLE.

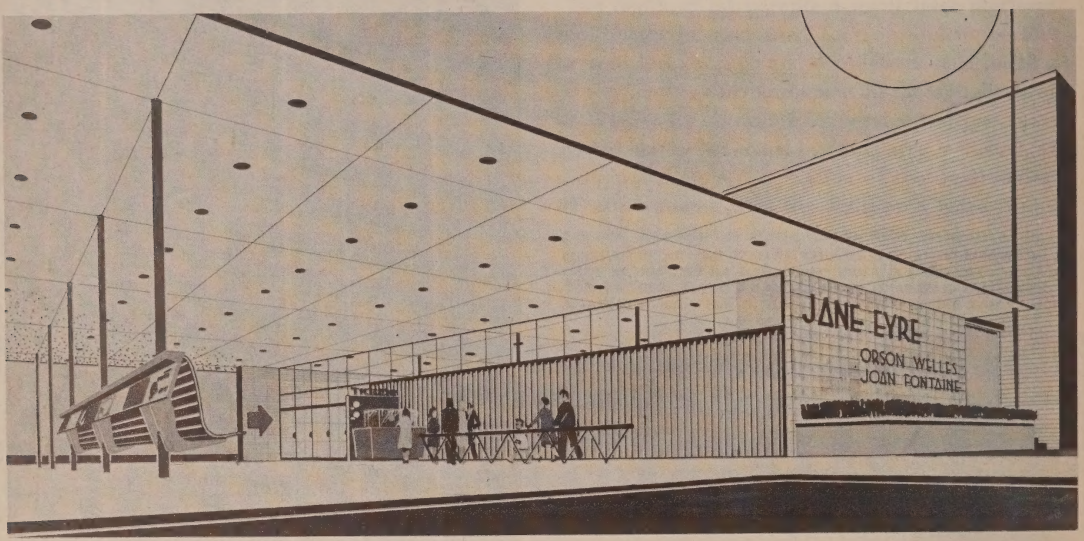


G. HOLMES PERKINS and
ROBERT A. LITTLE

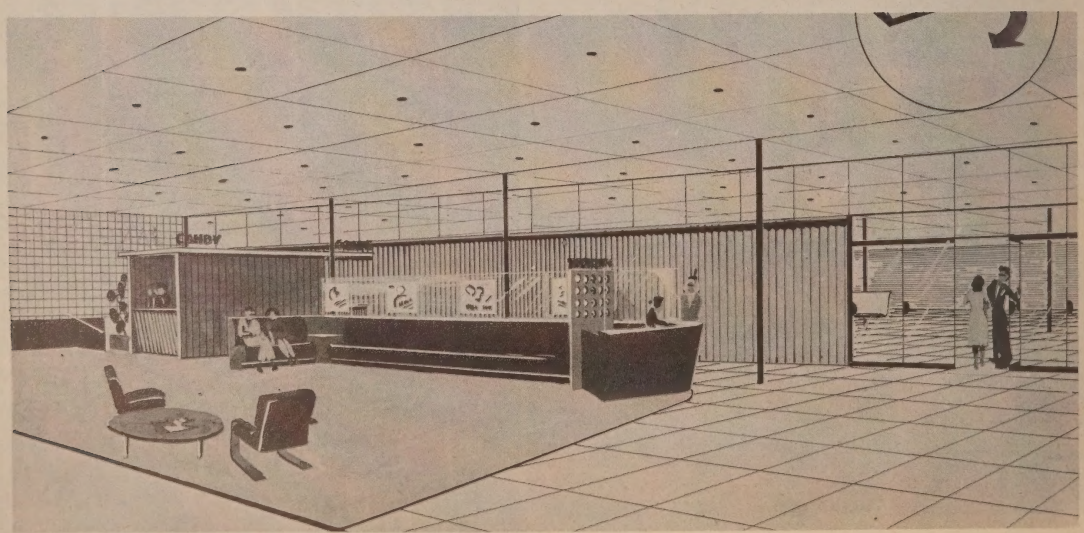
Present

A New Theatre

Undisclosed Address



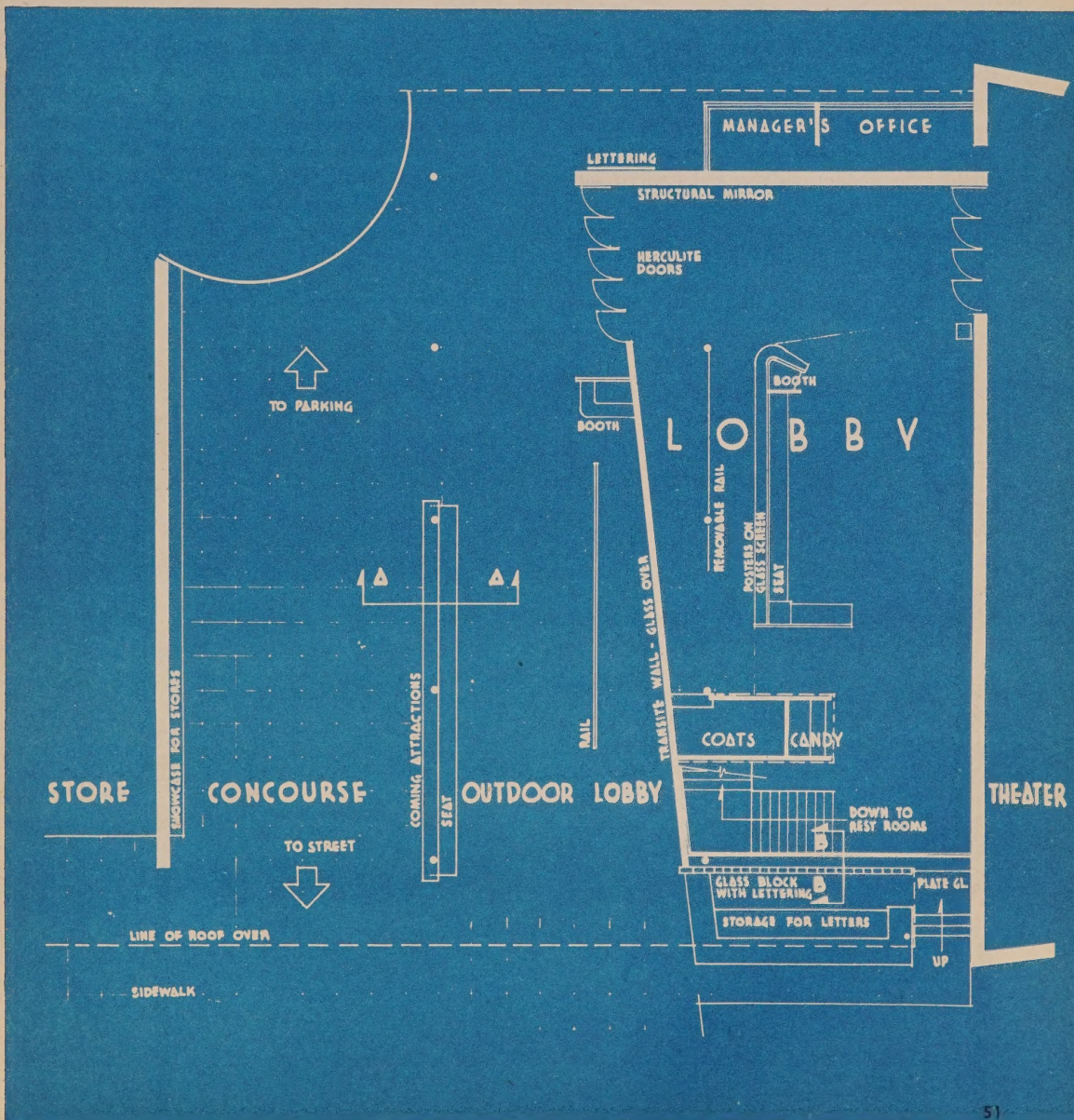
ADVERTISING INSERT POSTERS ON THE BACK OF THE WAITING BENCHES ARE DESIGNED TO ATTRACT THE PASSER-BY ENROUTE TO THE PARKING AREA. CONVENTIONAL BANK TYPE COUNTER SEATS WITH A LOW GLASS SCREEN BARRIER ABOVE, IS USED INSIDE THE LOBBY TO SEPARATE THE LOUNGE FROM POSSIBLE DRAFT FROM THE DOORS AND FROM CUSTOMERS WAITING TO BUY THEIR TICKETS FOR THE NEXT SHOWING.



This projected theatre is situated at the end of a row of shops, from which it is separated by a covered passage through to the parking area that serves the entire development. Part of this covered passage becomes an outdoor lobby for the theatre, incorporating ticket booth, seats for waiting, and showcase provision for posters of coming attractions. Inside provision is made for ticket buyers to stand in line without stringing out on the sidewalk. The lounge is separated from the heavy exiting traffic.

It is planned to mount changeable silhouette letters directly on the glass block wall used on the street facade of the lobby; with the light and moving pattern of the people inside forming a colorful advertising background. The entire opposite wall, between structural glass doors to the outer lobby and auditorium, will be covered with flesh-tinted, full-length mirrors to add inviting spaciousness to what should be a most popular area of the theatre.

Completely unconventional in its approach to the theatre design problem, the wide and varied use of structural glass is the dominant interest of this theatre. Rich in idea value, this proposed structure can bear close inspection by the interested new builder.



VINCENT G. RANEY

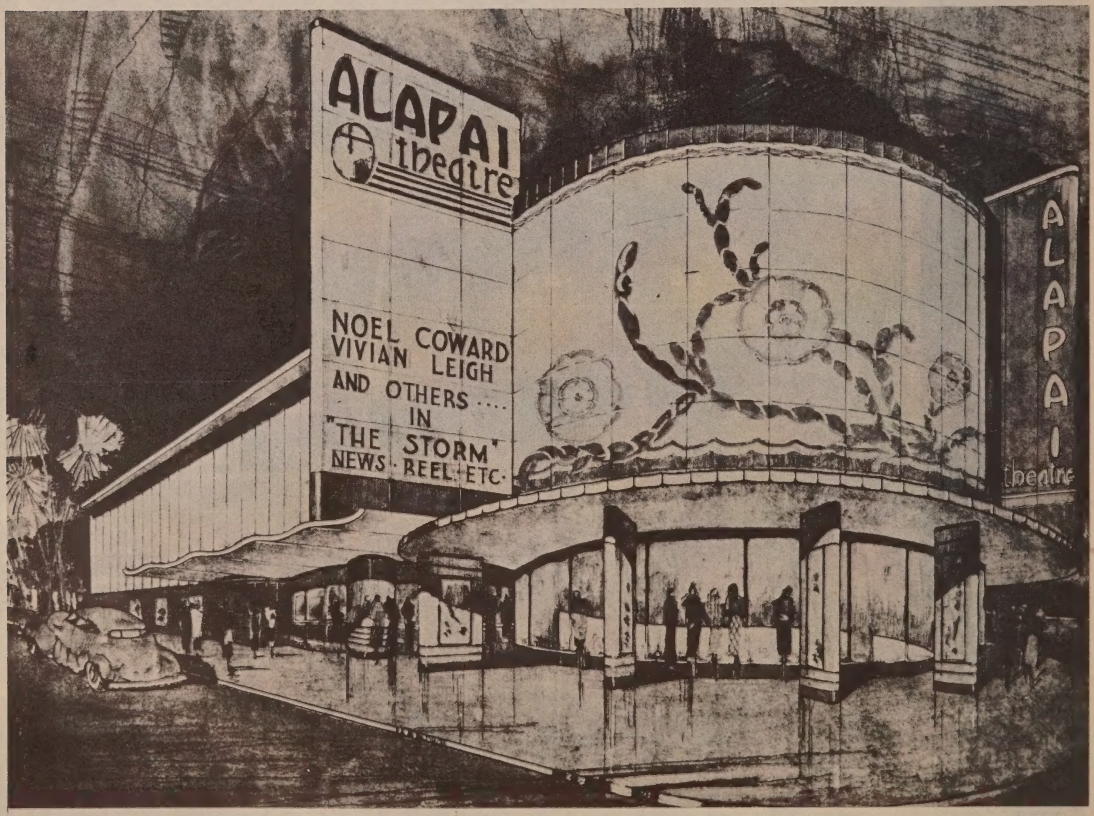
Presents

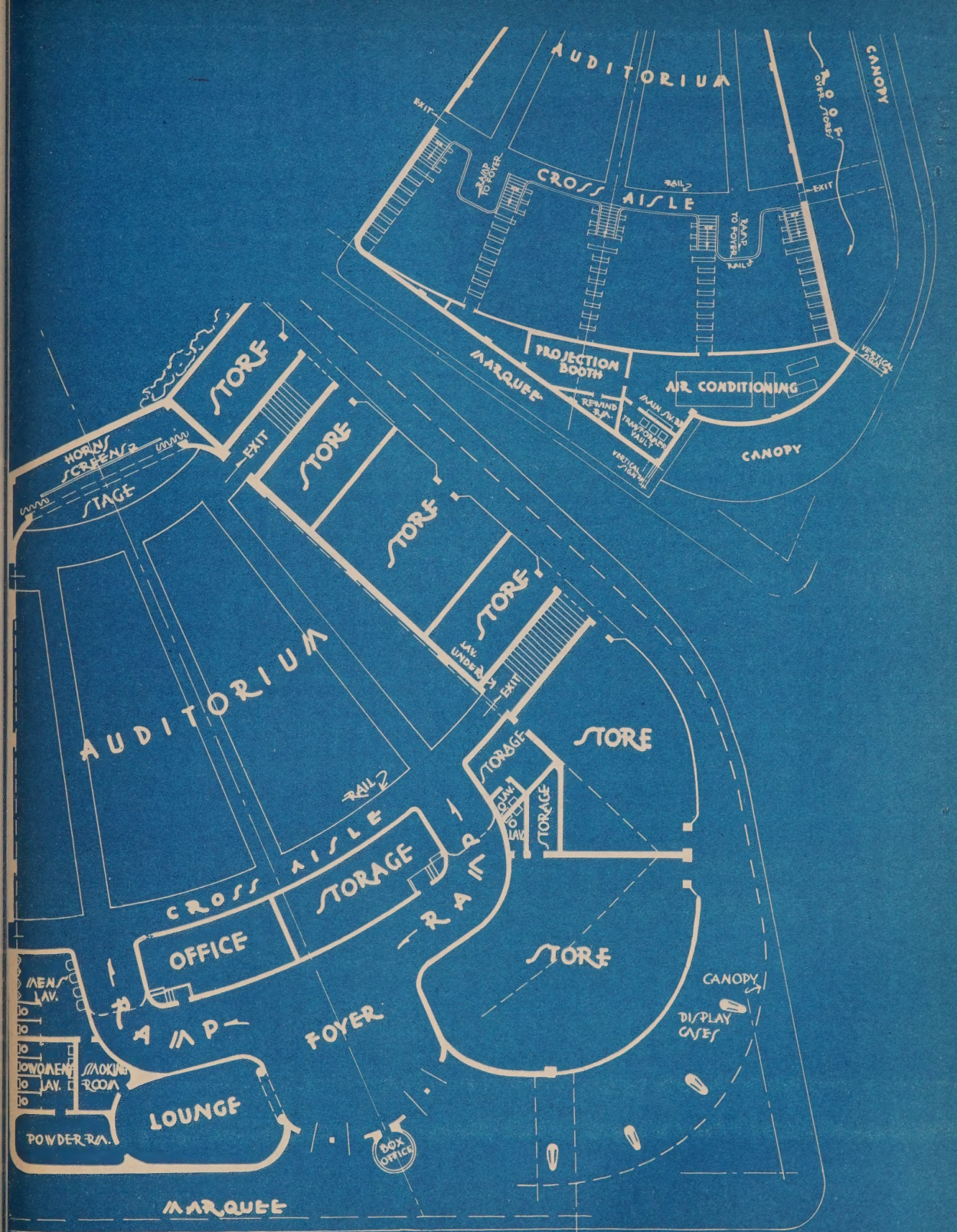
The Alapai Theatre

Honolulu, Hawaii

Another of the new theatres projected for the Hawaiian Islands is this new 1200-seat neighborhood house. On an odd-shaped lot with difficult grading conditions, this theatre-and-store project is designed to draw the maximum rental return from the available square footage. A large stadium floor doubles the auditorium size and projects out over the foyer and store area. The lounge and toilet rooms constitute a separate suite in one corner. All equipment rooms are confined to the second level back of the stadium. Of particular note is an exceptionally fine, high-rental store dominating the corner location; but, by carrying the marquee treatment completely around the project and using island display cases between the inner and outer sidewalks, theatrical feeling is retained. A kind climate permits direct access to the circular foyer through structural glass doors at either side of the island box office.

THE POSITIONING OF THE ISLAND DISPLAY CASES BETWEEN THE INNER AND OUTER SIDEWALKS AND THEIR USE AS SUPPORTS FOR THE WIDE MARQUEE CANOPY, IS AN INTERESTING ARCHITECTURAL DEVELOPMENT.




AUDITORIUM
EXIT
RAMP TO FOYER
CROSS AISLE
RAIL
EXIT
RAMP TO FOYER
RAIL
TO OUTER STORES
CANOPY
PROJECTION BOOTH
MARQUEE
AIR CONDITIONING
REWIND
MAIN SW.
TRANSFORMER VAULT
VERTICAL AWNING
VERTICAL AWNING
CANOPY
STORE
HORNS
SCREEN
STAGE
EXIT
STORE
STORE
STORE
LAV. UNDER
EXIT
AUDITORIUM
RAIL
CROSS AISLE
STORAGE
STORE
STORAGE
LAV.
LAV.
STORAGE
RAIL
STORAGE
OFFICE
STORE
MEN'S LAV.
RAMP
FOYER
CANOPY
DISPLAY CASES
WOMEN'S LAV.
SMOKING ROOM
LOUNGE
POWDER RM.
BOX OFFICE
MARQUEE

WILMOT C. DOUGLAS

Presents

The Wahouma Theatre

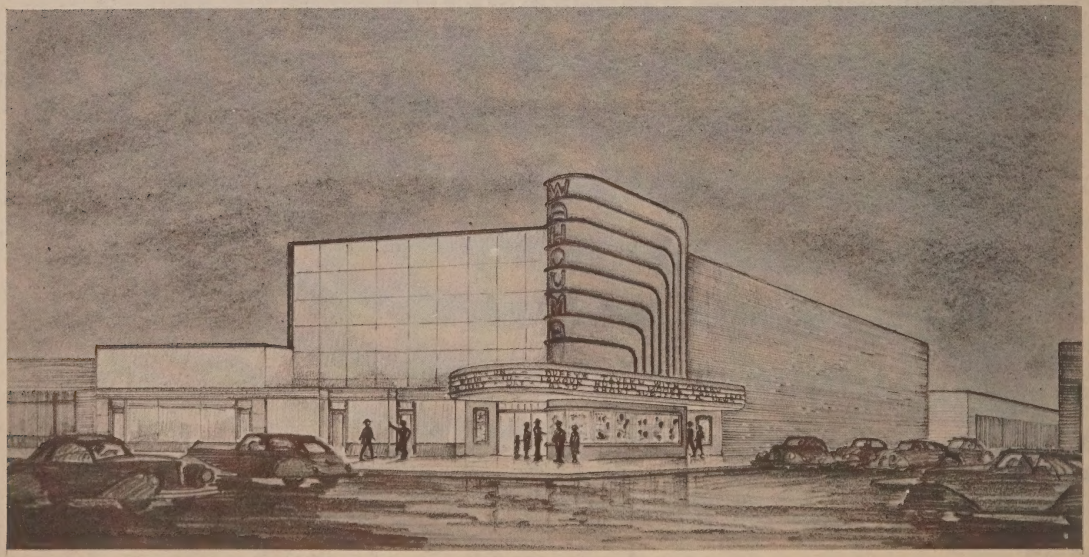
Birmingham, Alabama

This theatre will be located on a busy street in a population center about three miles from the main business section of the City of Birmingham. Because this street also serves as one of the main arteries for through traffic, great emphasis has been placed on the effective eye-stopping display of the front and upright pylon.

The anticipated patronage will be predominately white with a certain percentage of colored people which in this area will require the solution of the problem of proper segregation. This has been solved by providing two separate entrances and lobbies, one leading to the balcony for the colored patrons and the other leading to the main auditorium for the white patrons. Other features of such a twin enterprise are the candy counter, situated in such a location as to present its front to the standee area of the white section and its side to the lobby of the colored section, and the dual set of non-connecting toilet and rest rooms situated between the ceilings of the stores and the floor of the balcony at the high side.

The size of the plot is 89 feet by 152 feet, and the theatre will contain 604 seats in the main floor and 391 seats in the balcony for a total seating capacity of 995. Mild weather of its southern location

AN INTERESTING FRONT TREATMENT CARRIES THE SIGN WORK INTO THE COMPLETE FACADE THROUGH A TOWERING PYLON. EXCELLENT ADVERTISING DISPLAY SPACES ARE A RESULT OF THE DUAL BOX OFFICE.



will permit economies so that the estimated cost will be approximately $75,000.

Heating will be by warm air, filtered and blown through ducts; and the same duct system will be used to distribute conditioned and cooled air in the summer time.

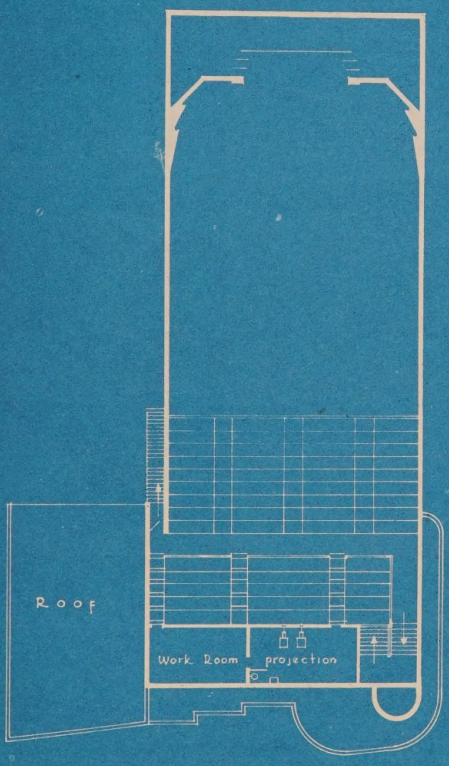
Walls will be of concrete masonry faced on the outside with brightly colored stucco for the front effect, and with brick on the less important back and sides.

The finish on the interior of the auditorium will make use of the actual lightweight concrete block of the walls themselves, tinted with water paints to give a travertine effect. As this type of concrete block has such a high sound absorption factor as to make other acoustical treatment on the walls unnecessary, the decorative accent will be placed on the stage and standee areas. Ceilings will be of fibre board applied in an interesting design to include the lighting and air conditioning duct work. Floors will be of poured concrete, covered with figured carpeting in the aisles and standee spaces, and with ceramic tiles in the lobbies.

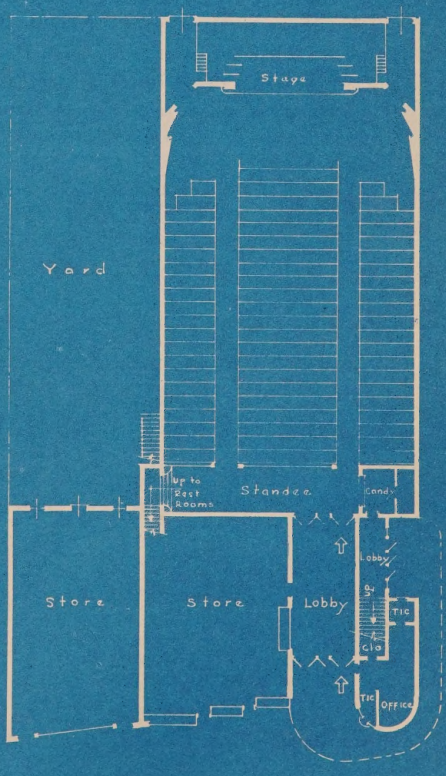
In the future management of this theatre, the generous yard back of the stores will no doubt become a surfaced parking lot which has become so necessary to the operation of a quality showhouse.

In analyzing these plans, the future theatre owner should also keep in mind that many eastern and large city building codes would require several additional exits and fire escapes, even though the building is fireproof.

THE DEPTH OF STAGE WILL PERMIT THE ADDITION OF VAUDEVILLE, AMATEUR NIGHTS, OR SOME CIVIC ENTERPRISES. THE POSITION OF THE MANAGER'S OFFICE IS EASILY ACCESSIBLE TO EITHER BOX OFFICE.



BALCONY



MAIN FLOOR

JOHN and DREW EBERSON

Present

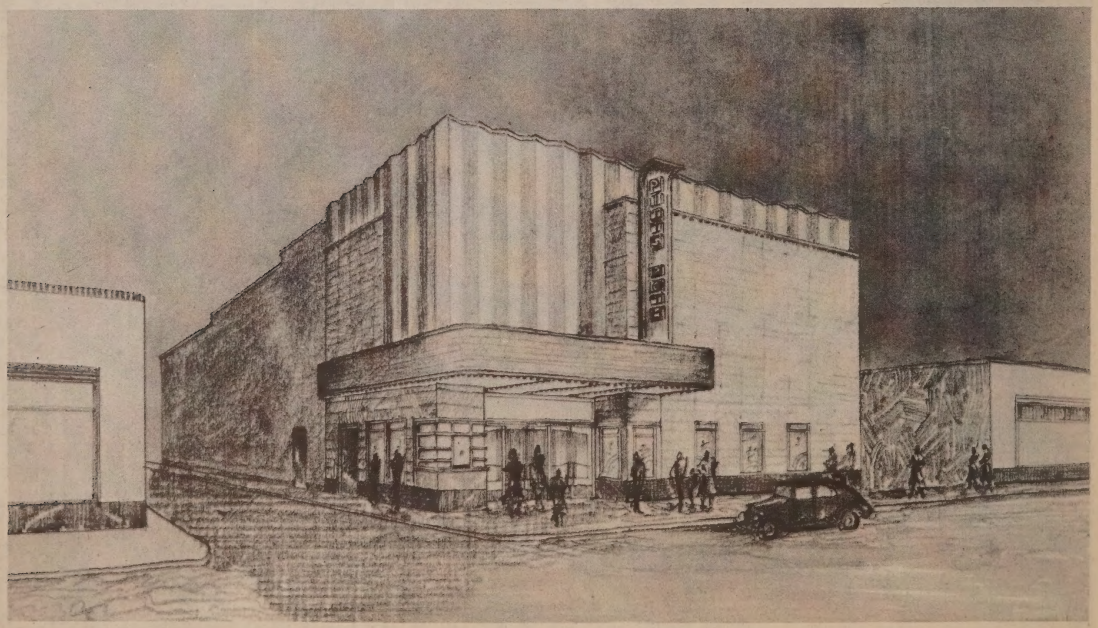
The Pitts-Roth Theatre

North Emporia, Va.

Another theatre which is certain to be erected just as soon as materials and manpower are available in economic quantities is this addition to the Pitts-Roth (Valley Enterprises, Inc.) independent circuit of which State Senator Benjamin T. Pitts, of Fredericksburg, Virginia, and Samuel F. Roth, of Washington, D. C., are the executive officers. Currently operating the Pitts and Roxy theatres in that community, this new theatre on Baker Street in North Emporia, will cater to a mixed clientele of colored and white, with the result that segregation is an architectural as well as a management problem.

The resultant plan indicates two separate units; namely, a 310-seat balcony complete with its own men's and ladies' rooms on the mezzanine, and a 444-seat main floor, complete with its own men's and ladies' rooms off the foyer. The box office is cleverly located between the two entrances so that ticket sales can be handled either separately at rush hours or from the same window for matinee and between-show sales. Only the entertainment portrayed on the screen and the heated or air-conditioned air are common to both parts of the audience through an arrangement like this.

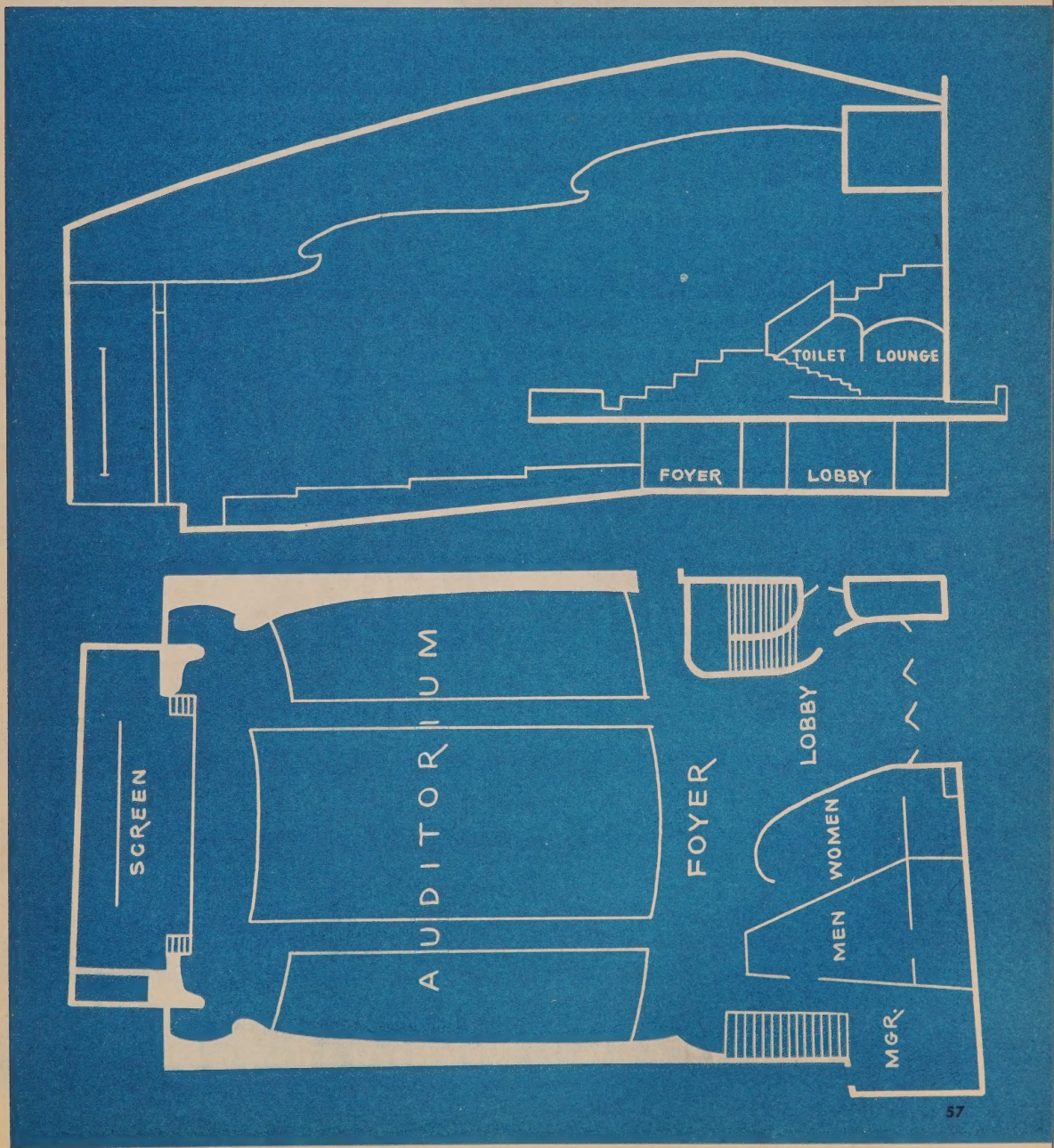
AS THE SIDE STREET IS OF LITTLE TRAFFIC VALUE, THE ACCENT HAS BEEN PLACED ON ATTRACTING THE PATRONAGE FROM THE FRONT ALONE. THEREFORE, THE UPRIGHT NAME SIGN BALANCES THE CENTER.



Of modern fire-proof construction, patron comforts will be accentuated to the extent of 36-inch chair spacing, and the latest in equipment and materials. One of the features of the auditorium will be a 39-foot stage with 14 feet of depth to the platform edge, and a 27-foot proscenium opening which will accommodate an occasional "live talent" presentation or some civic event.

The front will be executed in a combination of brick and terra cotta, with adequate display advertising spaces recessed and shadow lighting at the sidewalk level of the facia.

THESE TWO PLANS MUST BE CONTRASTED TO UNDERSTAND THE MANNER IN WHICH COLOR SEGREGATION HAS BEEN ACCOMPLISHED SO AS TO REDUCE TO A MINIMUM ANY POSSIBLE LATER MANAGEMENT FRICTION.



VINCENT G. RANEY

Presents

The Lelani Theatre

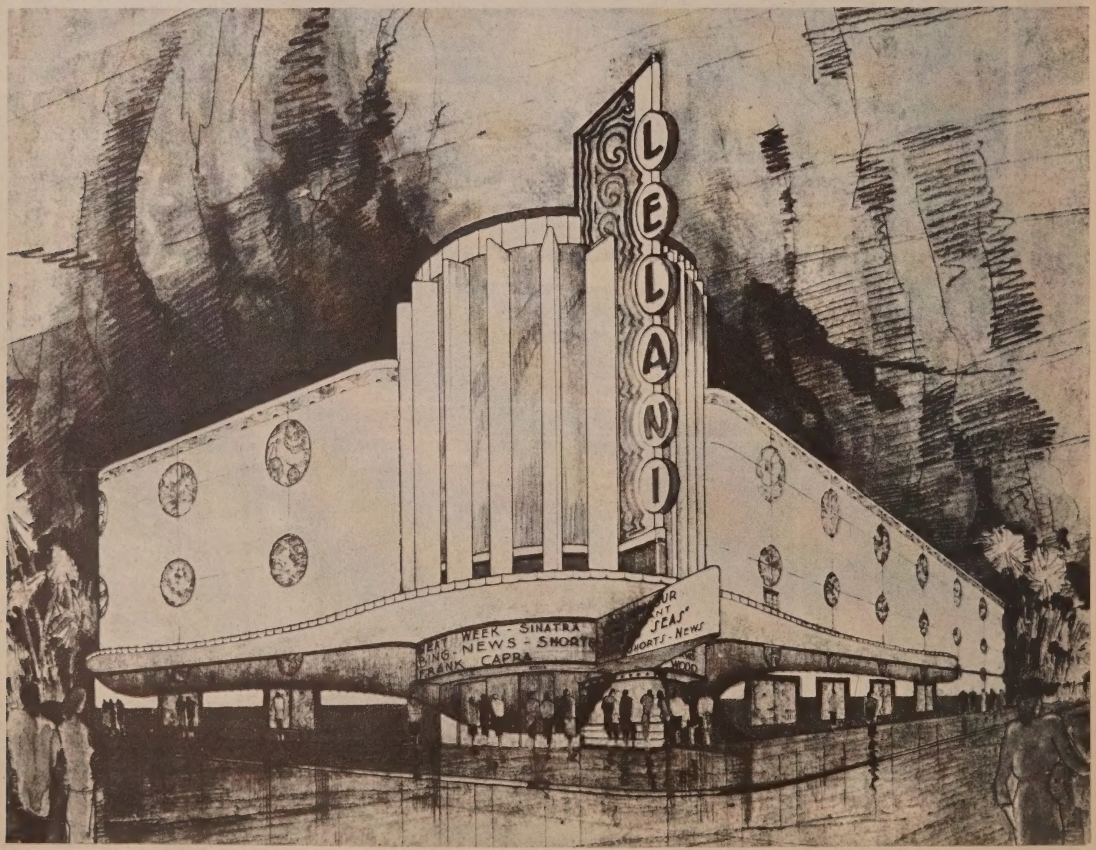
Honolulu, Hawaii

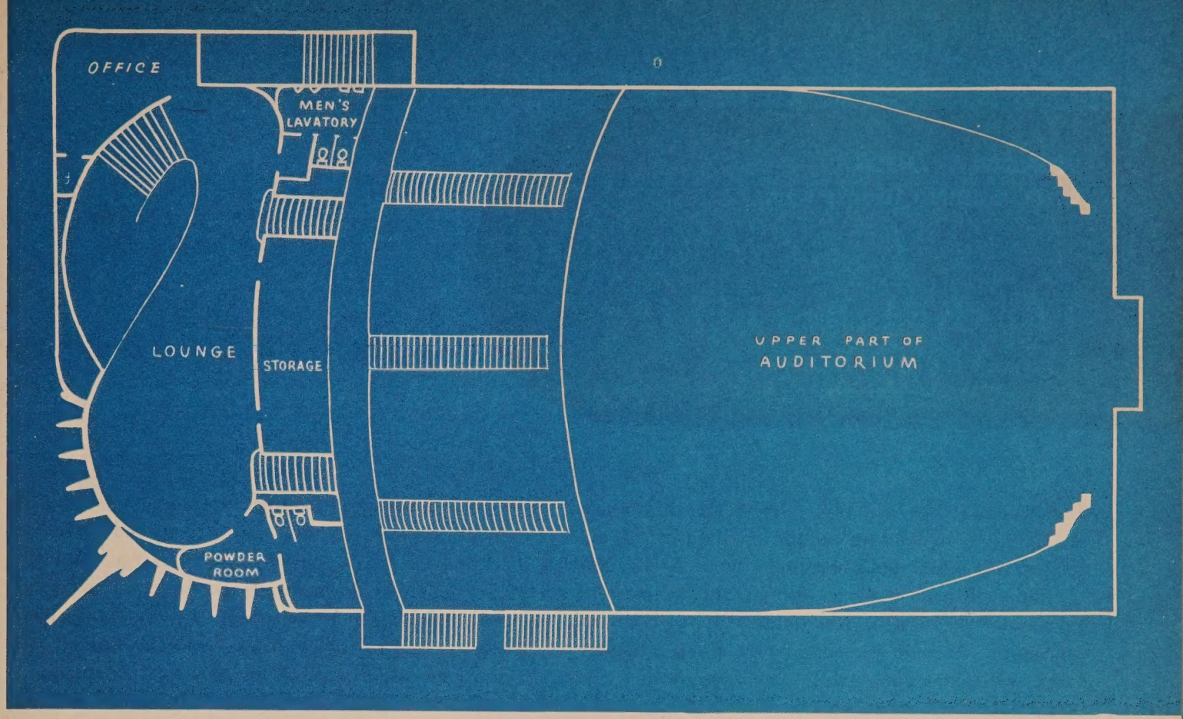
Due to their strategic importance and the probability that a tremendous flow of commerce will continue to pass through them in the post-war era, there are many new theatres planned for the Hawaiian Islands.

One of the most prominent is this 1,500-seat modern first run, which is planned for the heart of the business section of Honolulu.

The lavish treatment of the oval foyer and mezzanine lounge connected by a sweeping grand staircase, is designed to impress the people of many races with its luxurious appointments. Direct access from the street to the foyer will carry the selling qualities of this treatment to the casual passer-by, as well as awe the incoming patron. Separate toilet and rest rooms are provided on both the auditorium and balcony floors.

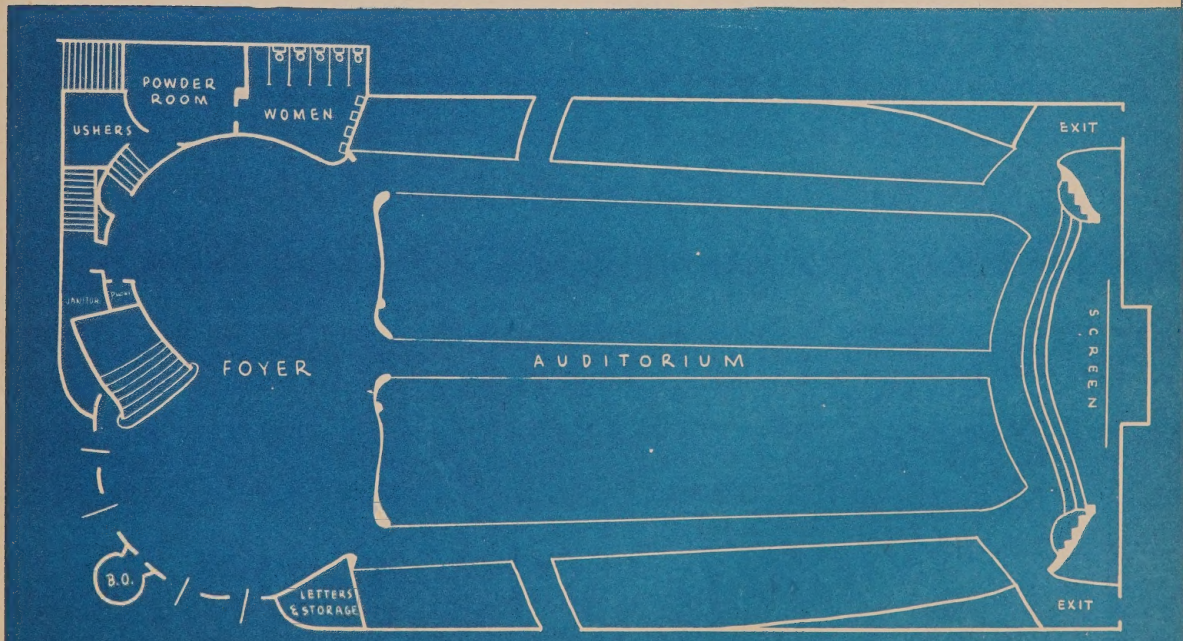
The auditorium is designed for perfect sound, with acoustically treated curved walls replacing the usual standee rail.





THE FLOOD-LIGHTED, TRIANGULAR FINS AND UPRIGHT SIGN ARE DESIGNED TO ATTRACT ATTENTION TO THE BUILDING, DECLARING TO THE WORLD ITS THEATRICAL NATURE. ADEQUATE CHANGEABLE-LETTER ATTRACTION BOARDS BENEATH THE LARGE CANOPY MARQUEE PROVIDE THE SPACE FOR SELLING THE CURRENT SHOW.

IN THE MAIN-FLOOR PLAN CAN BE NOTED THE INTERESTING TREATMENT OF THE AISLE HEADS. LADIES' POWDER AND TOILET ROOMS AND MEN'S SMOKING AND TOILET ROOMS ARE A FEW STEPS DOWN AND UP, RESPECTIVELY, THEREBY SHARING THE FOYER HEIGHT AND ADDING FURTHER TO THE CINEMA'S SUMPTUOUS



VERNON A. MOORE
A. O. BUDINA, Consultant

Present

The Beach Theatre

Virginia Beach, Va.

Construction has already started on this resort theatre and, depending on the availability of materials, it is scheduled for completion in July, 1946.

This will be a modern, spacious theatre catering to summer vacationists, but designed for year-'round operation. It will be completely fire-proof with brick walls, structural steel frame, reinforced concrete floor and stair construction, and a gypsum roof deck on bar joists. The lobby floor will be of terrazzo, with the foyer, lounge, and aisles carpeted and the auditorium floor covered with asphaltic tile. The auditorium walls will be of acoustical plaster, decorated in pastel colors. All portions of the theatre will be completely air-conditioned during winter and summer, using steam and refrigeration, respectively, for the heating and cooling media.

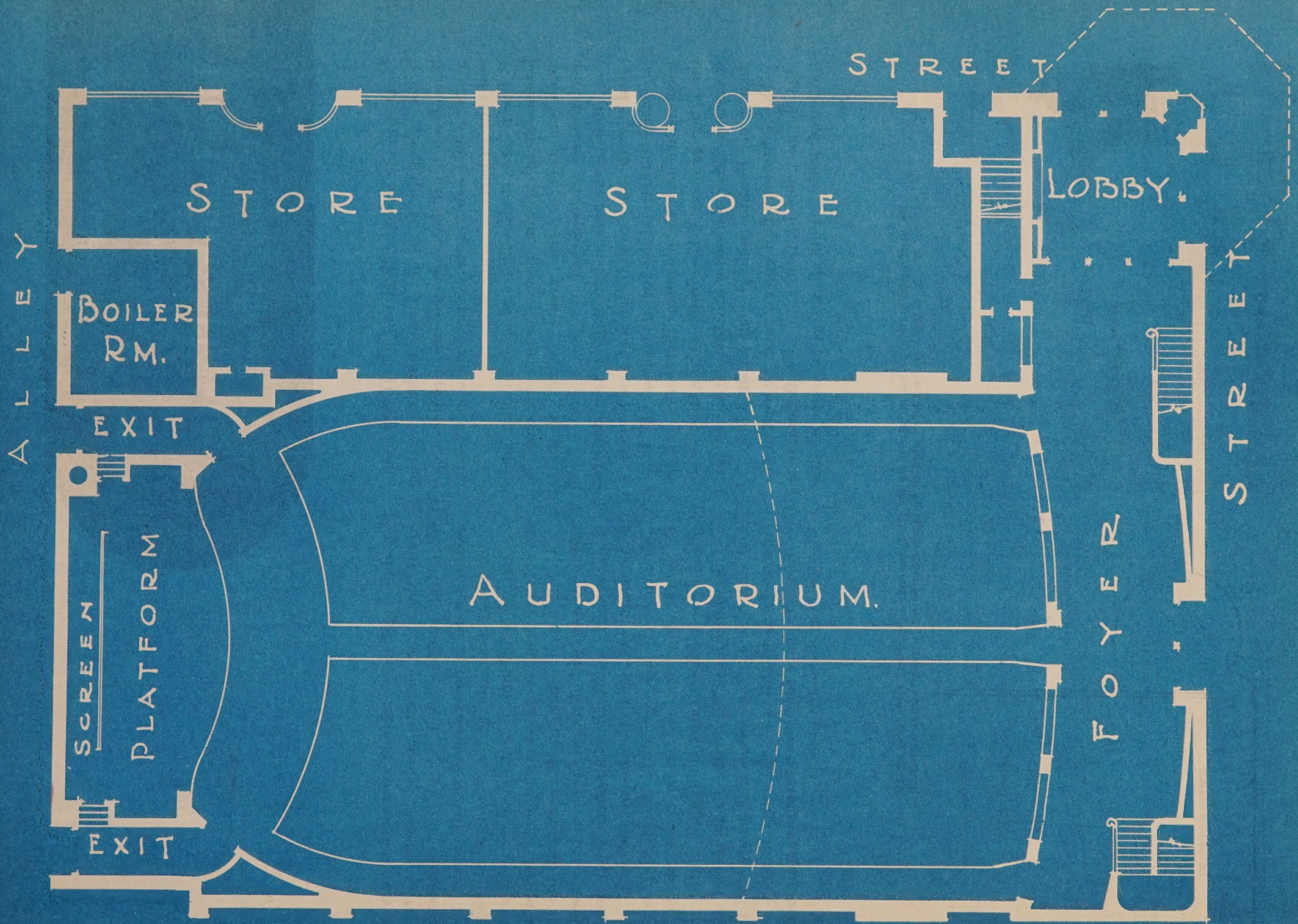
The entire project has been developed with the idea of maximum pleasure, comfort, and convenience to the patrons. All seats are spaced 36 inches back-to-back. The screen is extra large, and the floor slope has been carefully designed to afford perfect vision from every seat. Liberal areas have been allotted on the balcony level for lounge and rest rooms which will be luxuriously furnished.

The orchestra floor will seat 860 and the balcony 340, for a total capacity of 1200 patrons.

On the exterior, the first story walls are to be faced with Virginia greenstone, and the upper stories with Old Williamsburg hand-made-type pink face brick, trimmed with limestone.

As an example of solid permanence, resulting from an established patronage and many years of theatre construction experience, the ultimate structure should be worthy of note.

THE ENTRANCE DOORS WILL BE OF TEMPERED STRUCTURAL GLASS; THE POSTER FRAMES, STORE FRONTS, AND ENTRANCE DOOR FRAMES OF BRONZE; AND ALL WINDOW FRAMES AND SASH OF ALUMINUM OR BRONZE.


STREET
STORE
STORE
LOBBY
ALLEY
BOILER RM.
EXIT
AUDITORIUM.
FOYER
STREET
SCREEN
PLATFORM
EXIT

VINCENT G. RANEY

Presents

The Camino Theatre

Pittsburg, California

Located in the business district of this 10,000-population community is an old garage building which, it is planned, will be converted into a project comprising a 900-seat theatre, stores, and a large cafe and cocktail bar.

The theatre itself will be of stadium plan, and, because the other contemporary projects are cleverly fitted into its space needs, greata efficiency in space use has been accomplished.

A study of the area and its traffic potentials indicated that the theatre entrance had to dominate a particular corner and through its lighting and theatrical nature draw the patronage that would support the other projects. The fronts of the two small stores were also placed toward that corner so that their minor lighting could give all possible help.

The auditorium itself was assigned the least profitable plot area, but this resulted in a lengthy entrance foyer and lobby. Full advantage is taken of this length by applying sweeping curves that very naturally serve the various needed functional rooms under the stadium level. Even the acute-angled area under the lower stadium—usually wasted space—supplies needed storage facilities back of the bar.

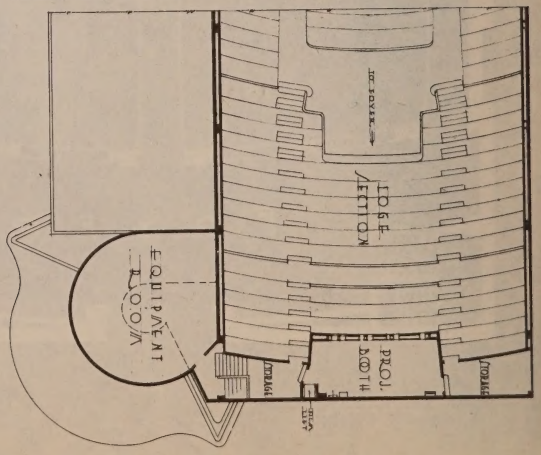
Climatic conditions permit direct access from the street to the oval foyer past a well-placed island box.

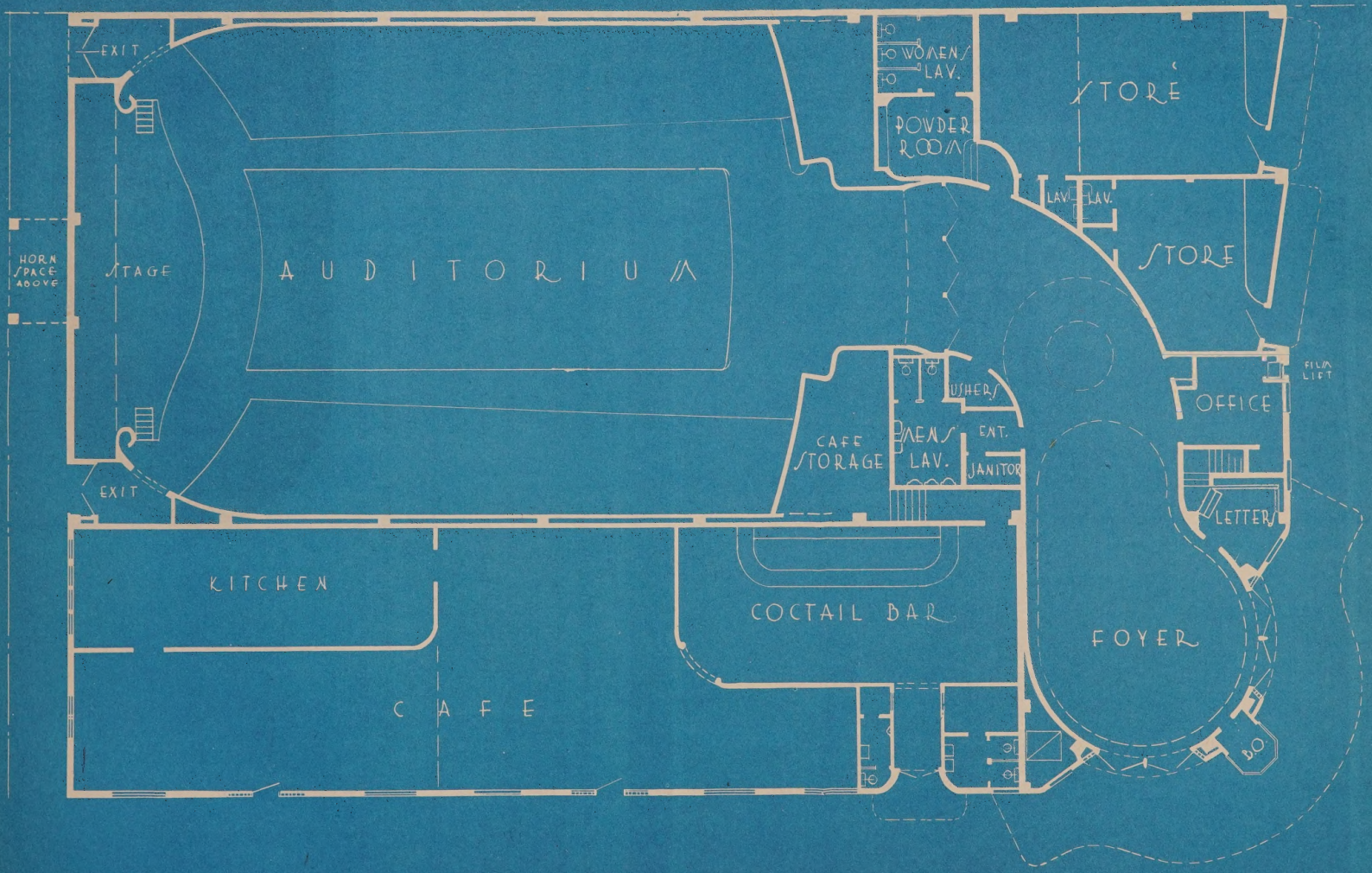
A double wall, separating the cafe from the auditorium proper, will effectively prevent the noise that is particularly inevitable in kitchens from proving a disturbing element to the theatre audience. As a united project, however, all of the possible savings in central plant heat and refrigeration can be applied to the service of each individual unit.

The auditorium itself will be simple and dignified with a small stage apron and ornamental stage corners focus attention on the entertainment area.

Adequate space for air-conditioning equipment is situated over the outer foyer.

THE DIRECTIONAL NATURE OF THE FRONT PITCHES THE SALES MESSAGES OF THE THREE ATTRACTION BOARDS TO THE TRAFFIC AREAS. THE STRUCTURAL LINES OF THE BUILDING ALSO AID IN DIRECTING THE ATTENTION.





MAIN FLOOR PLAN

VINCENT G. RANEY

Presents

The State Theatre

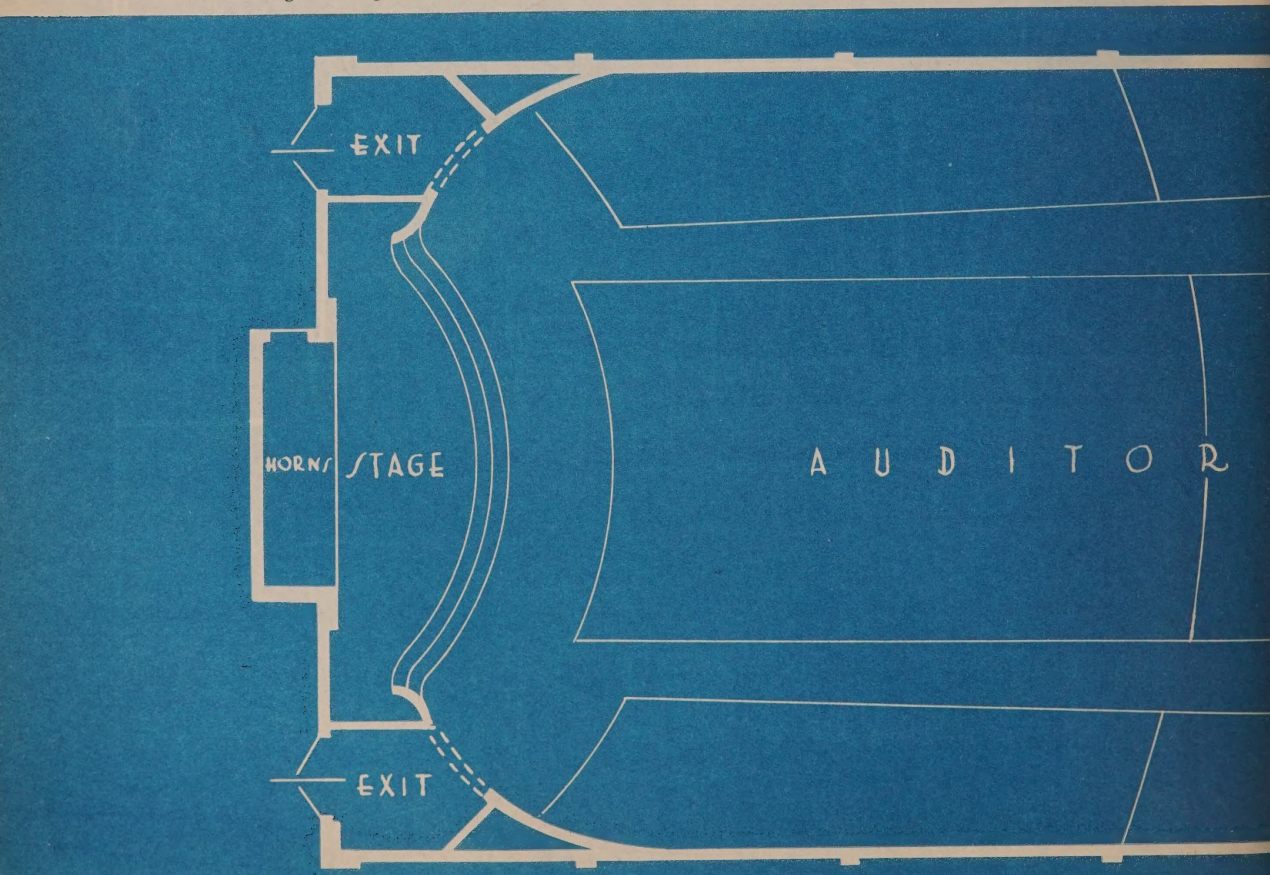
Shafter, California

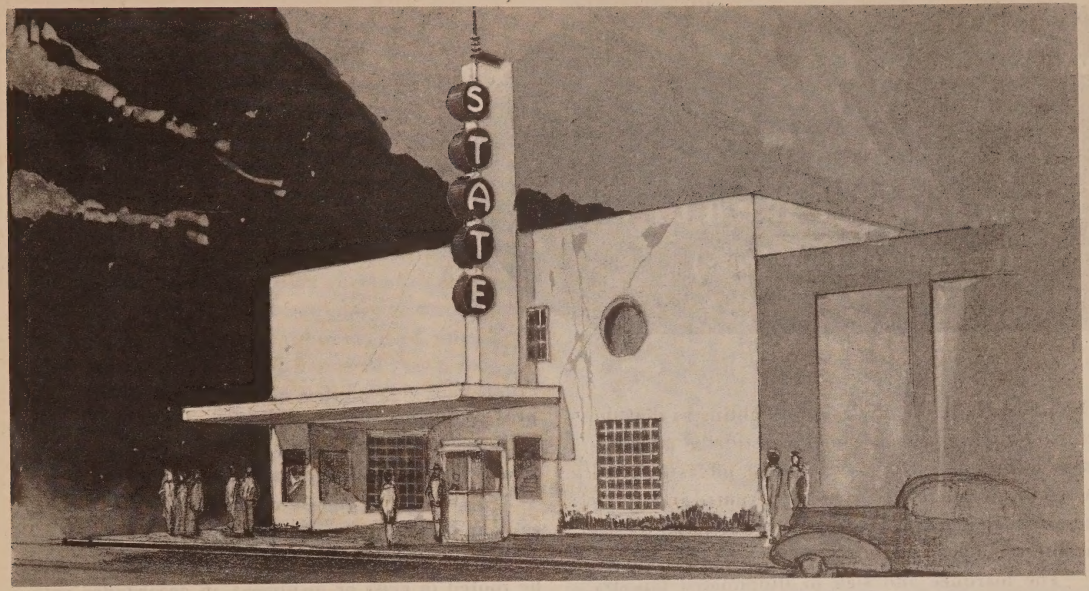
Designed for a small town in a rural community, this compact little 500-seat theatre will be economically constructed, but will provide the maximum in patron luxury and patron comfort.

Of interest in the plan, is the manner in which the circular foyer has been brought close to the street, thus to provide direct entrance doors without the usual inner lobby. Acting as the key to the entire plan, it is easy to visualize the decorative motif and furnishings that will make this foyer attractive and inviting. A large and attractive lounge entered through a draped arch will provide a community waiting room and traffic overflow between shows; while the normal toilet and rest rooms and an interesting box-office location, radiate from the circle. While the plan shows no specific locations for the desirable candy counter and drinking fountain, many effective locations are possible.

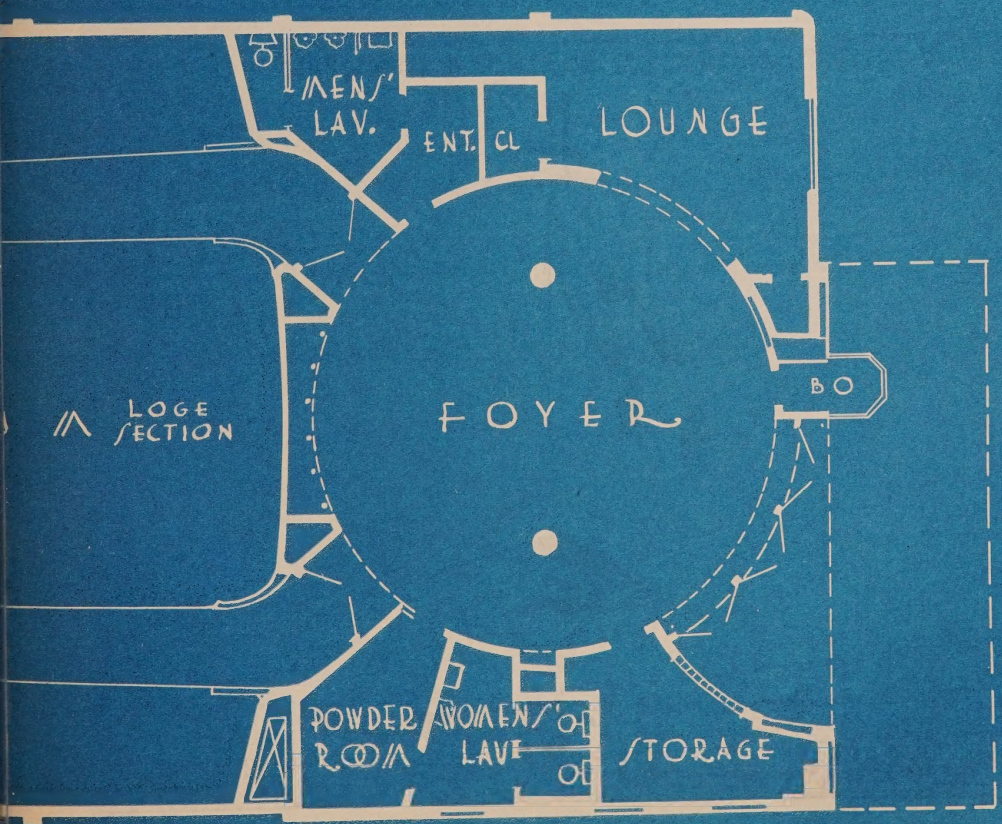
It is planned to make the auditorium very simple with decorative accent on the stage proscenium.

All equipment rooms will be on the projection room level.





IT IS FELT THAT THE COMMUNITY DOES NOT REQUIRE THE USUAL CHANGEABLE LETTER ATTRACTION SIGN, SO A VERY SIMPLE CANOPY SUFFICES, AND ADVERTISING IS LIMITED TO RECESSED AND LIGHTED FRAMES.



WILLIAM LESCAZE

Presents

The Cin Theatre

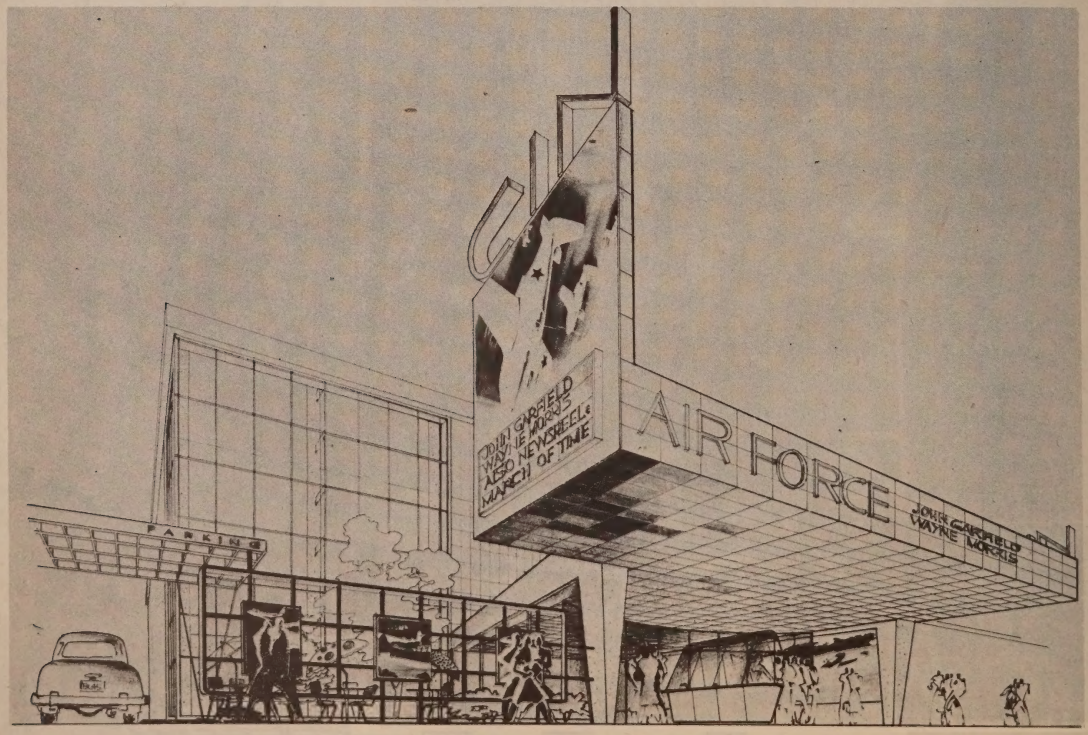
(Undisclosed Address)

Dramatizing the use of glass and lighting so that the entire building front becomes a distinctive and theatrical sign, this proposed theatre offers unusual possibilities where the weather permits, and many new thoughts which might be considered in even northern climes.

The marquee and sign of illuminated tapestry glass offer a striking and flexible method of advertising. Illuminated Kodachrome transparencies provide further means of display. The ticket booth, with its "turret top" of multi-plane safety glass acts also as an observation control.

To the left of the entrance is a garden-lounge, surrounded by a glazed trellis screen and the clear glass walls of the lobby and foyer. This area could be roofed in glass or awninged, in accordance with the season or the desires of the management, and is situated in such a way as to be used as the candy

IN ANY EXTENSIVE USE OF PLAIN GLASS, THE WARM GREENERY AND INFORMAL OUTLINES OF HORTICULTURAL PLANTING AS A CONTRAST TO RECTANGULAR ARCHITECTUREAL SHAPES, SHOULD BE ENCOURAGED. NOTE HOW THE DISPLAY BOARDS IN THE TRELLIS SCREEN ADD A NEW AND NOVEL TOUCH TO AN UNUSUAL DESIGN.

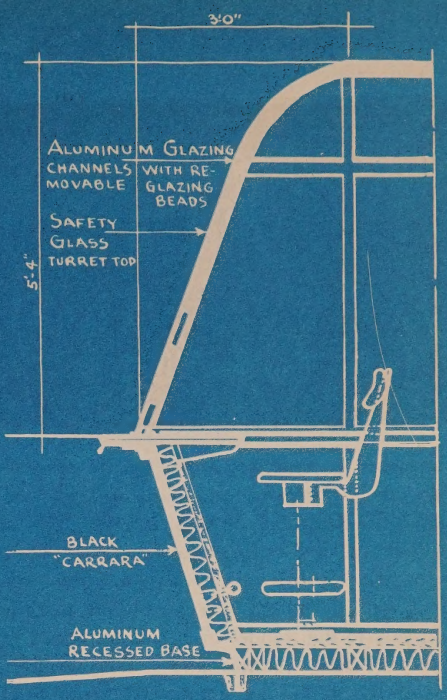


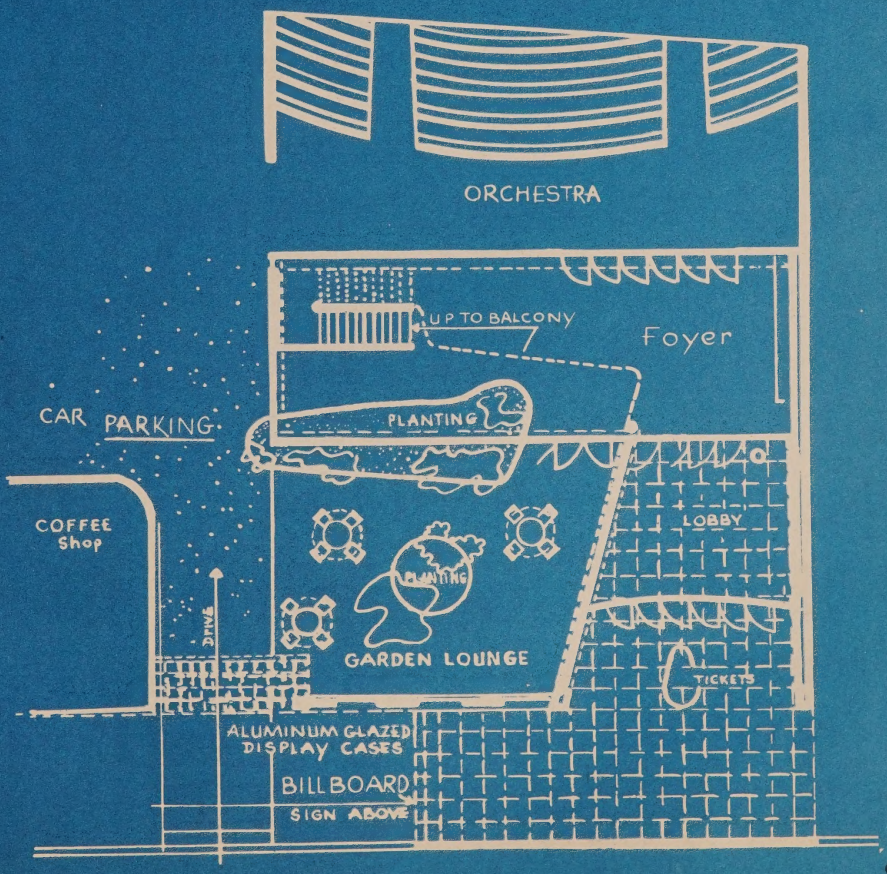
and soda bar of the theatre, as well as playing to outside patronage from the street. As a waiting room while cars are parked, or as a neighborhood meeting place, its advantages are obvious.

Where parking is not considered essential or where some other entrance to the parking era can be worked out there is no reason why this garden-lounge could not tie together the coffee shop and the theatre into an interdependent enterprise with profit to each part. The open, inviting effect of such a plan would be certain to attract patronage to the area.

Where such a parking entrance is used, attention should be directed to the advantage of the structural glass parking marquee which will provide protection to the arriving or departing patrons during inclement weather.

NOTE THE THREE SETS OF STRUCTURAL GLASS DOORS THROUGH THE LOBBY AND FOYER AND INTO THE AUDITORIUM. ALSO THE FACT THAT A MINIMUM OF DECORATION WOULD BE NEEDED IN THE AUDITORIUM ITSELF AS A CONTRAST TO THE BRILLIANCE OF THE LIGHTED SILHOUETTES OR ETCHED MURALS THAT WOULD BE POSSIBLE IN THE FOYER AND LOBBY AREAS. THE "TURRET TOP" BOX OFFICE HAS POSSIBILITIES FOR OTHER MODERN THEATRE PLANS.





TALMADGE C. HUGHES

Presents

The Wayne Theatre

Wayne, Michigan

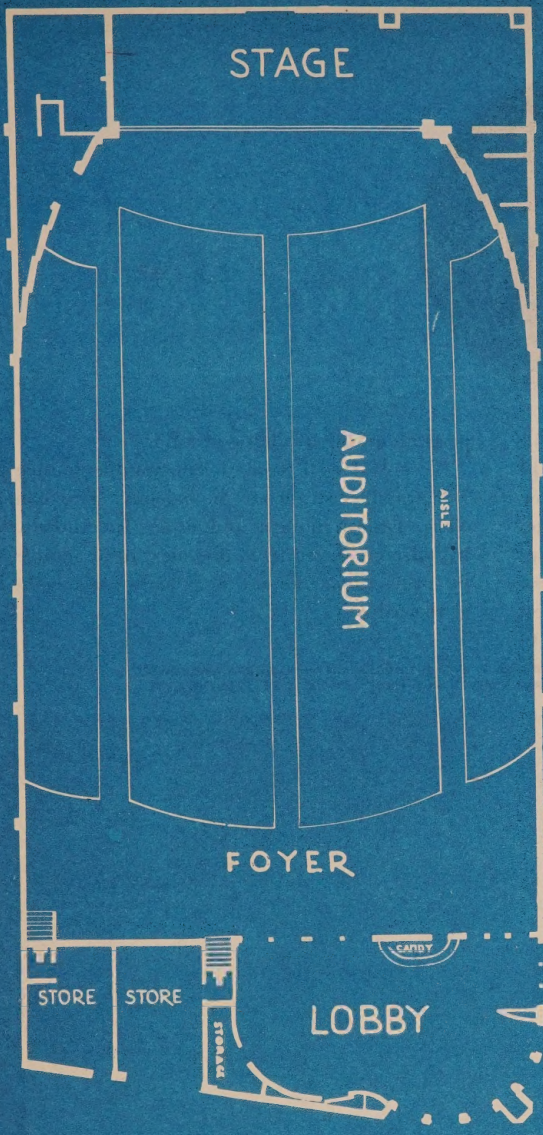
Designed as a deluxe annex to the present Shafer Wayne Theatre and to be built on the latter's parking lot is this new 1500-seat project. The structure will be of cinder block and face brick, with a gypsum-slab roof to attain modern fire-proof standards.

A multi-faced rotunda type lobby permits access directly to the standee area and features a centrally located candy counter and a dumb-waiter to the booth for all film deliveries. Stairs from the standee area serve the men's, ladies', cry, projection, and manager's office rooms, all of which are located on the second floor. A stage 20 feet deep, with a proscenium opening of 49 feet, will permit any flesh presentations which are deemed necessary.

Sturdy, modern construction and the basic simplicity of the functional plan are the outstanding characteristics and it is felt that this theatre is typical of many of the fine, permanent structures that are now under construction.

In both the stage and projection-room areas, generous space has been provided to accommodate television equipment should the latter eventuate.

EACH RECESS IN THE SIMPLE, MULTI-PLANED FACIA WILL BE INDIVIDUALLY FLOODLIGHTED FROM BELOW IN ORDER TO PRODUCE THE DESIRED EFFECT OF FLUTED MASSIVENESS AGAINST THE DARK SKIES OF NIGHT.



FIRST FLOOR PLAN

MEZZANINE PLAN

RAYMOND SIZEMORE

Presents

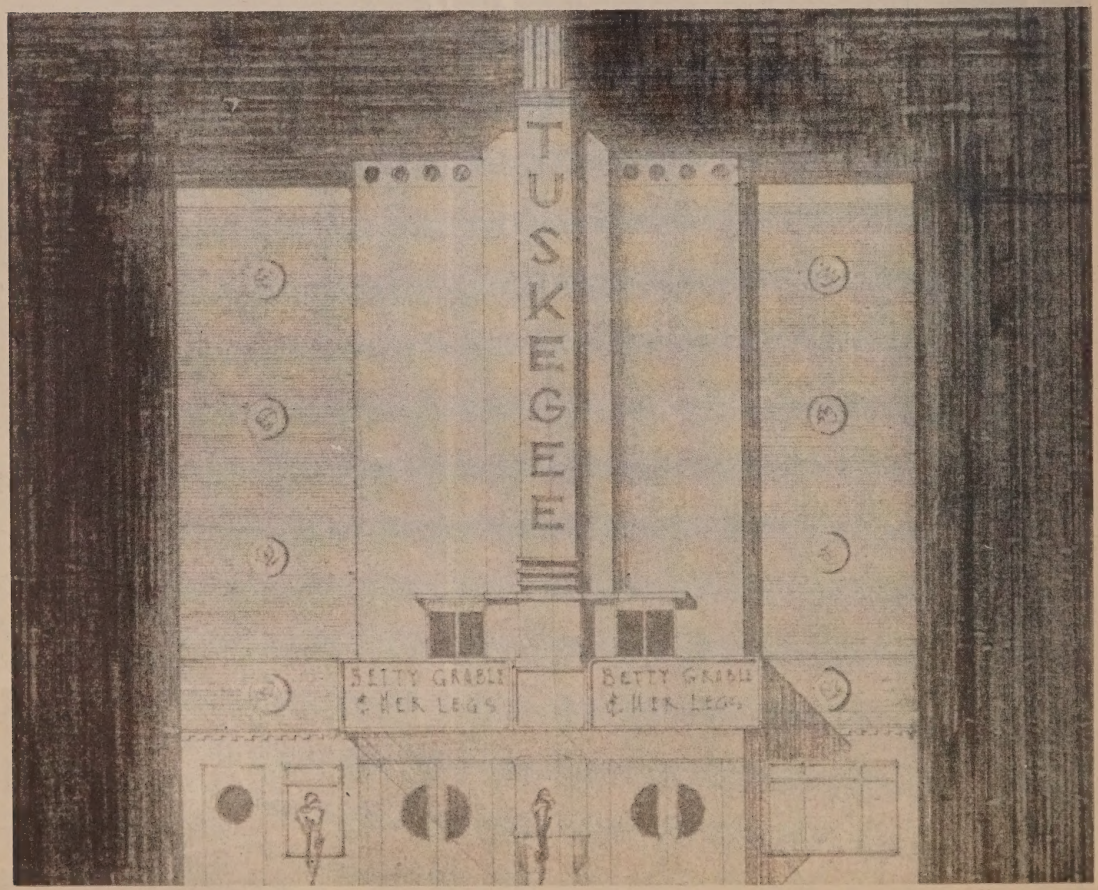
The Tuskegee Theatre

Tuskegee, Alabama

An orchestra seating 658 and a balcony seating 342 will enable this new theatre to accommodate 1,000 patrons. The plot being extremely long and narrow (176 x 44 feet) has enabled the use of a large stage, complete with a full fly loft. The placement in separate housing at the extreme rear, of the washer and fan rooms for the air conditioning has also been possible on the available ground.

A central well from the mezzanine lounge level will provide entrance to the balcony. The manager's office, ladies' lounge, and other functional rooms will also be served from this mezzanine lounge, with the projection room one story higher and at the back of the balcony.

THE APPEAL OF THE FRONT WILL BE SIMPLE AND DIRECT, WITH THE ACCENT ON THE LIGHTED NAME TOWER. THE DOOR AT THE LEFT PROVIDES A VERY DESIRABLE DIRECT EXIT FROM THE THEATRE'S BALCONY LEVEL.



FAN Room
Roof over exit hall
UPPER PART OF STAGE
Roof over dressing R.
BALCONY LEVEL
BALCONY
DOWN
STOR
UP
DOWN
WOMEN
LOUNGE
OFFICE
STOR.

DRESSING
RAMP UP
STAGE
DRESSING RM.
AUDITORIUM LEVEL
ORCHESTRA
FOYER
MEN
LOBBY
UP
STOR.
STOR

THALHEIMER & WEITZ

Present

The Motio Theatre

Undisclosed Address

TAKING FULL ADVANTAGE OF A DOMINANT CORNER ON A HEAVY-TRAFFIC ARTERY, THIS USE OF TWO NAME PYLONS AND A VAST CHANGEABLE-LETTER, SHOW-SELLING AREA, PRESENTS A PROSPECT OF GREAT INTEREST.

To take advantage of the vast space above the marquee — for advertising which may be viewed from a great distance — there is provided a large area of rough opal glass, illuminated from behind, with moldings designed to receive interchangeable metal frames to set up copy and caricatures, either of special design cut from hard board, or stock plastic letters.

Immediately adjacent to this sign space, on both sides, are two pylons of wine structural glass, extending from sidewalk to roof; each pylon containing gold colored neon tubes set in stainless steel channel signs.

The marquee facia will be constructed of moldings with Alumilite finish, and end facias will be provided with illuminated feature signs to be viewed where the large feature sign is not visible. The soffit of the marquee will contain gray structural glass with reflectors and bands of illuminated Bevelite (soft tone finish) glass carrying into the lobby.

The exterior walls flanking the main entrance will be faced with glass. The portions around exits on the main street and on the side street under covered passage will be of wine color glass. Other areas will be of ivory glass, splayed in bands to carry up and toward the wine colored pylons flanking the entrance.

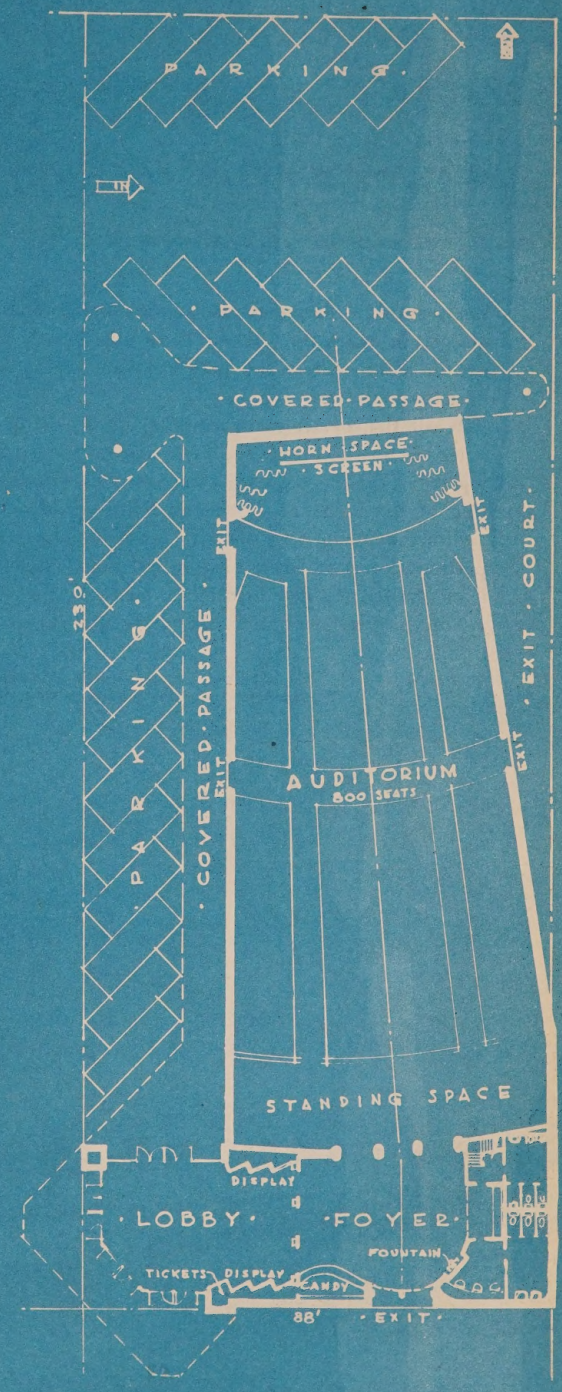
The lobby walls will be of suede finish ivory structural glass, splayed in sections so that poster displays will face incoming traffic on the right and outgoing on the left side. Grilles of stainless steel on upper section of side walls will provide outlets for air conditioning. Ceiling will be of plaster, tinted to match the ceiling of the marquee. Reflectors and bands of illuminated Bevelite (soft tone finish) glass will carry in from the marquee and finish over the entrance doors with an illuminated mural of sculptured glass.

The foyer walls will be beige structural glass, suede finish, trimmed in ivory with a plaster ceiling.

The auditorium will have a wine colored wainscot, trimmed with beige. Walls and ceiling are of acoustical plaster.

One of the main features of this theatre will be the convenient parking area and covered passage leading from the parking area to the theatre entrance for inclement weather.

The candy counter is advantageously spotted close to the ticket booth, yet inside of the spacious foyer where it can serve the standees. Off this foyer also are the men's and ladies' rooms, complete with a common lounge. The manager's office and projection rooms are on the second-floor level.



THALHEIMER & WEITZ

Present

The Tele Theatre

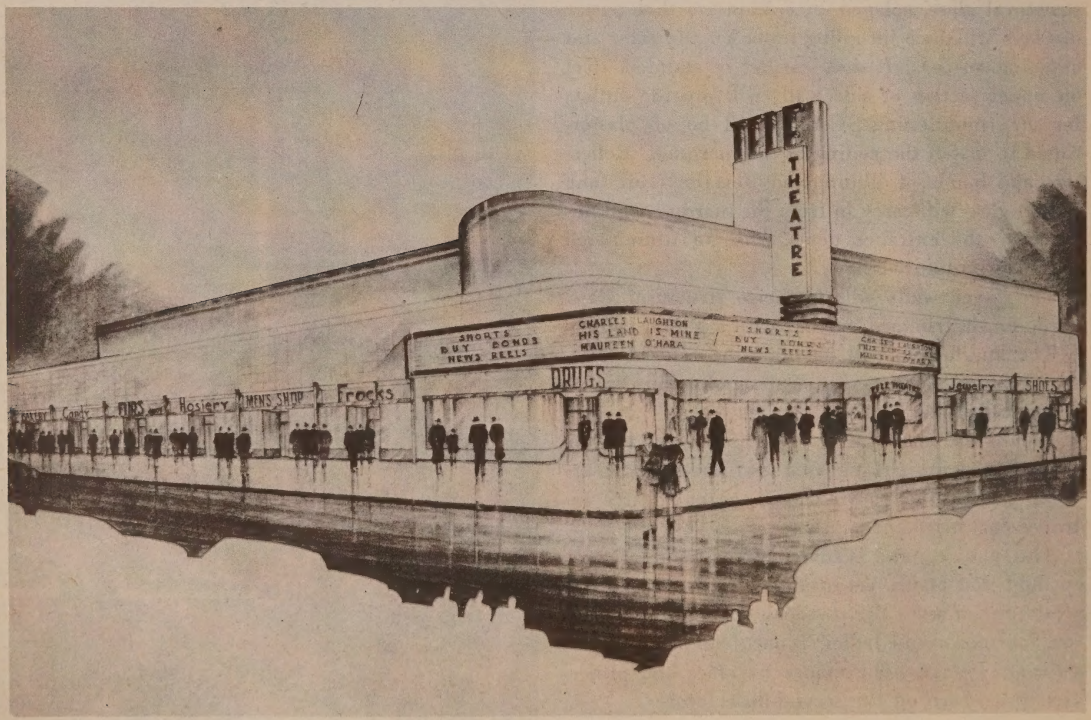
Undisclosed Address

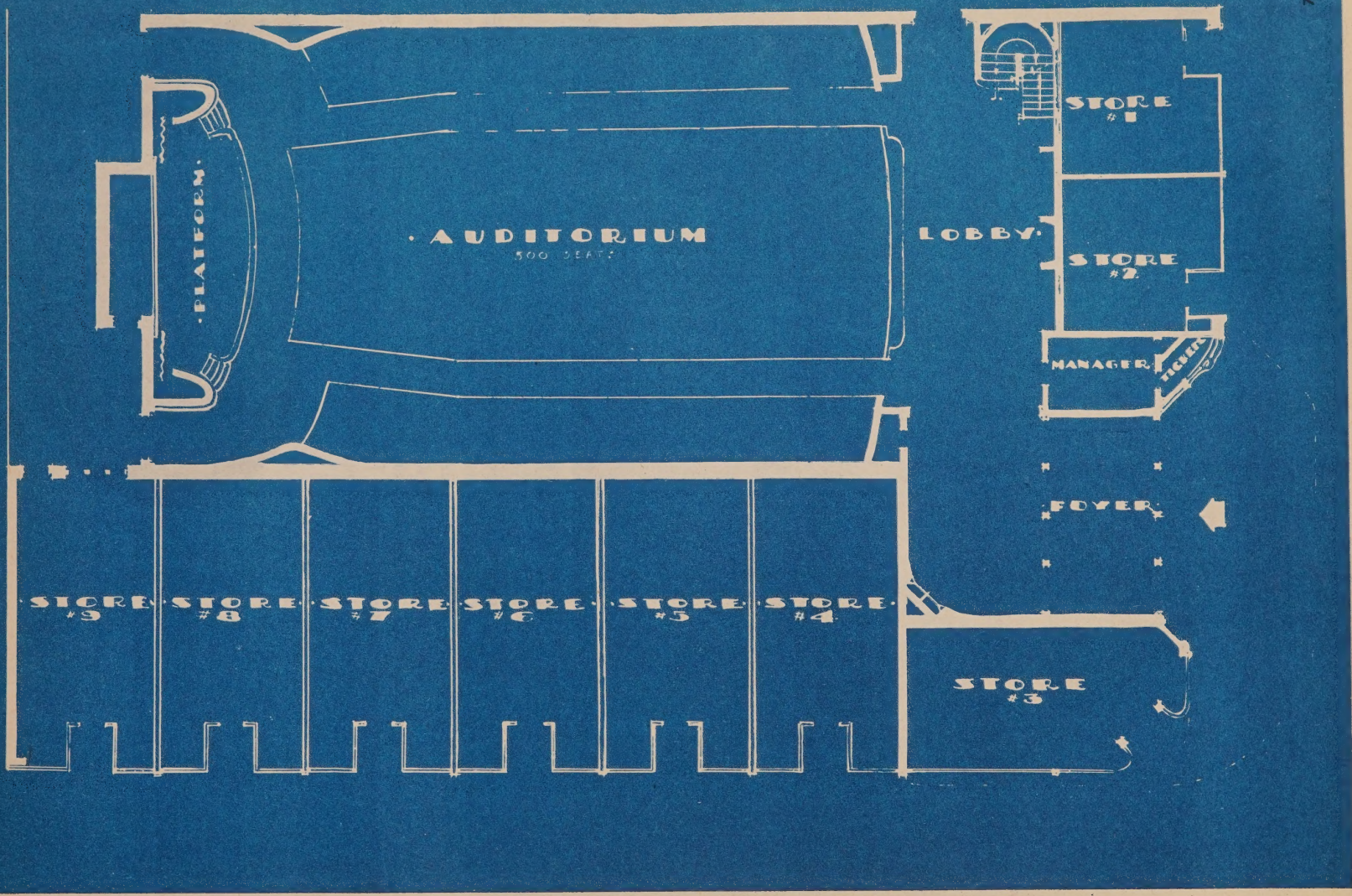
Very frankly designed as an income-producing project, in which the 500-seat theatre is the key but not the chief interest, this plan has wide application in many locations.

While the theatre marquee both lights and dominates the main corner, the foyer shares the square footage of that corner with a fine store. Clever handling of the L-shaped foyer and lobby enables the auditorium proper to use the least valuable rear portion of the lot, while eight other stores surround it on the street sides. Further to enhance the rent-paying properties of such a project, apartments or professional offices might be built over the store areas.

As a theatre study, the resulting show house is pleasing and smartly adequate to modern standards. The manager's office is in a prominent position for patron service and crowd control, and the door directly into the ticket booth provides many safety features. Many locations for candy machines or a candy counter are available in the inner lobby, while the grand staircase to the usual men's and ladies' lounge rooms on the second level provides a decorative lobby spot.

THE NAME PYLON AND GENEROUS MARQUEE DOMINATE A FACADE WHICH WILL ACQUIRE A SWEEPING MODERN LINE THROUGH THE USE OF PORCELAIN ENAMEL, FACE BRICK, AND STAINLESS MOLDING TRIM.




PLATFORM
AUDITORIUM
500 SEATS
LOBBY
STORE #1
STORE #2
MANAGER
TICKET
FOYER
STORE #9
STORE #8
STORE #7
STORE #6
STORE #5
STORE #4
STORE #3

F & Y BUILDING SERVICE

Presents

The Belmont Theatre

Dayton, Ohio

This theatre is proposed for the South Side section of Dayton, which is the most rapidly growing in the city and populated principally by workers in the many fine industrial plants.

The size of the lot is 98 x 200 feet, with the longer dimension fronting on the main-traffic street. Due to local zoning restrictions, the size of the theatre had to be limited to an area of 72 x 180 feet.

Construction will be modern and fire-proof with exterior walls of brick, except for the front, which will incorporate terra cotta and marble facings. The roof will be of steel, with bar joists and metal deck, covered with insulation and built-up roofing materials. The concrete-slab floor will be covered on all

A FORMAL, MODERN-CLASSIC DESIGN FEATURES THE FRONT AND MARQUEE TREATMENT. FOUR LARGE POSTER FRAMES AND A SIX-LINE MARQUEE PROVIDE ADEQUATE SHOW-SELLING SPACE. NOTE THE NAME-SIGN.

traffic areas with either carpeting or terrazzo. Interior walls will be of decorative plaster, with plaster light troughs; while the acoustical treatment will be accomplished by the use of fabric-covered, rock-wool blankets.

Air conditioning will be through a combination of well water, filters, coils, fans, and sheet metal ducts; with an under-floor tunnel for the re-circulation of air. It is proposed to heat the building with hot water from a natural gas hot water boiler and flowing through the same coils.

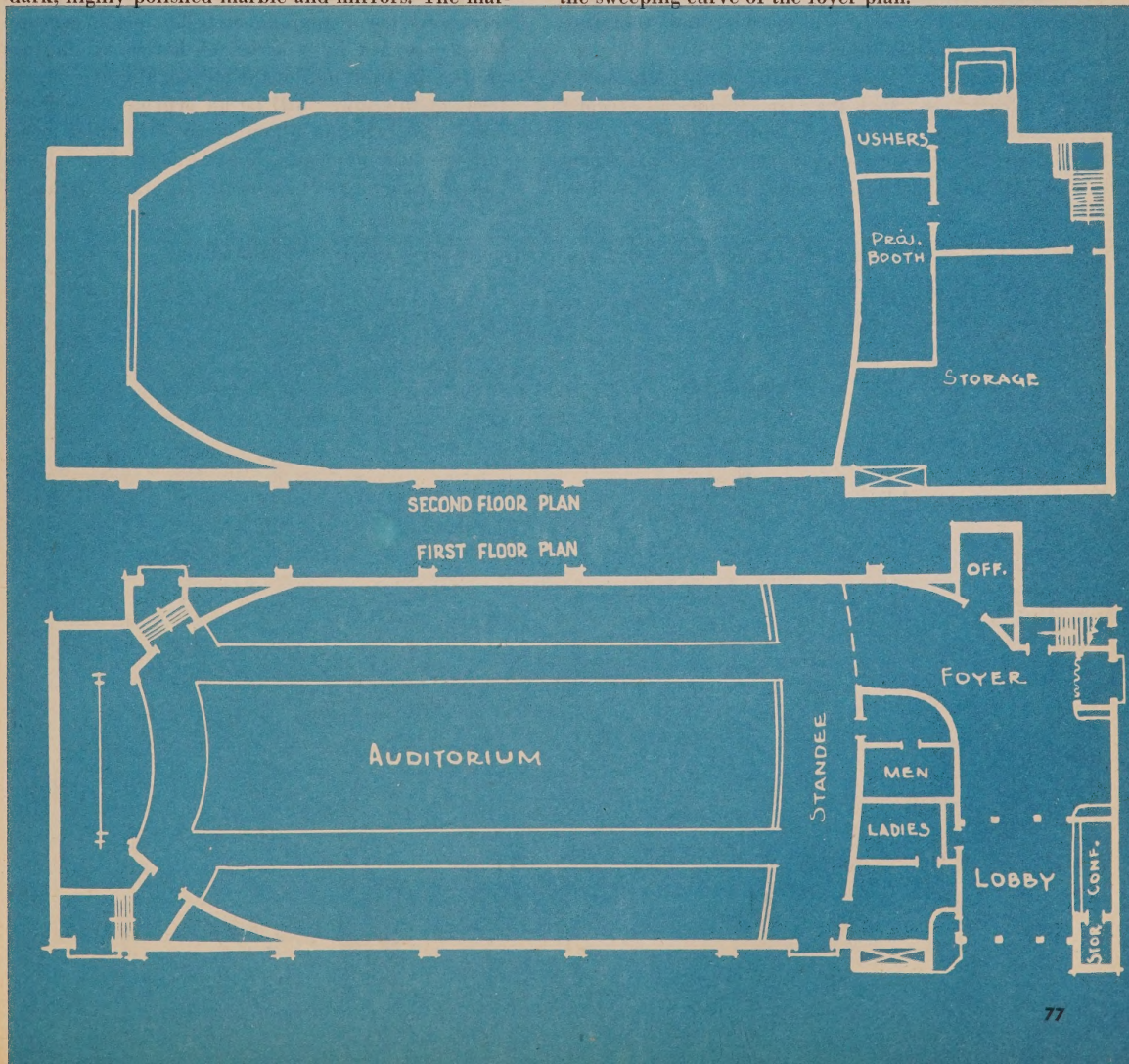
The approximate cost without ground will be $125,000.

In design, the front elevation actually becomes a part of a long side elevation due to the peculiarities of the location. Below the marquee, an attractive result will be accomplished with a combination of dark, highly polished marble and mirrors. The marquee itself is a six-line, V-shaped type. The field above the marquee consists entirely of terra cotta with a molded frieze and coping above, and a single marble ornament inserted. The tower at the left of the front elevation is ornamented by artistically-designed, deep-channel letters spelling out the theatre name.

The floor plan is such that no light can approach the screen during daytime operation.

The spacious lobby will be completely flanked on one side (20 feet) by a large confectionery counter, with the necessary storage facilities back of the exterior display frames. In addition, there is a ladder and changeable-letter closet which can be entered from the outside.

The men's and ladies' lounge rooms are entered from the standee area; but their rear walls provide the sweeping curve of the foyer plan.



F & Y BUILDING SERVICE

Presents

The Covedale Theatre

Cincinnati, Ohio

This one-floor, auditoriumed, neighborhood theatre has been designed for Cincinnati's residentially-desirable Price Hill district, where patron demands for comfort and good taste are above average. Competition in that area is considerable, and, therefore, heightens the need to excel.

Completely fire-proof, with brick walls and a reinforced steel roof, the plan includes all accepted developments in modern building methods.

An unusual exterior treatment will utilize the combination of three facing materials in a very striking fashion: architectural terra cotta of various colors, local limestone (more commonly called rubble-stone), and buff-colored face brick. The entire front design will feature chiefly a massive, elliptical, terra-cotta tower approximately 20 feet in circumference topped by a series of horizontal flutings around the front half of the ellipse. Mounted on the front of this tower will be an ornamental vertical name sign. On top of the horizontal fluted ornamental top is perched a huge lantern of metal and glass, in turn topped by a metal spire that will extend

BETTER UNDERSTANDING OF THE MANNER IN WHICH A VARIETY OF COLORS AND MATERIALS WILL BE BLENDED INTO A PLEASING BUT DIFFERENT FACADE, CAN BE GAINED FROM THIS ARCHITECT'S SKETCH BELOW.

about 62 feet from the grade.

The marquee will be quite large and irregular in shape.

Some idea of the colorful nature of this exterior can be gained from these specifications of the materials to be used: Base course, blue grey; panel over marquee, buff, surrounded by ivory fluted molds and copings; field panel and cap behind garden plot, ivory; pilasters, buff; tower, ivory with fluted ornaments of canary yellow; and the ornaments in the rubblestone, turquoise.

To the left of the tower effect, a formal garden wall will be used to set off the ornamental panel that highlights that portion of the front elevation. The entrance beneath the marquee will be featured by a semi-circular box office and six solid-glass doors, with two side lights. Entering into the first foyer are six additional glass doors. This foyer is a kidney-shaped two-story effect, 16 feet wide by 55 feet long, entering directly on the standee space. All of the above areas are to be ornamental with appropriate modern design for a deluxe neighborhood theatre.

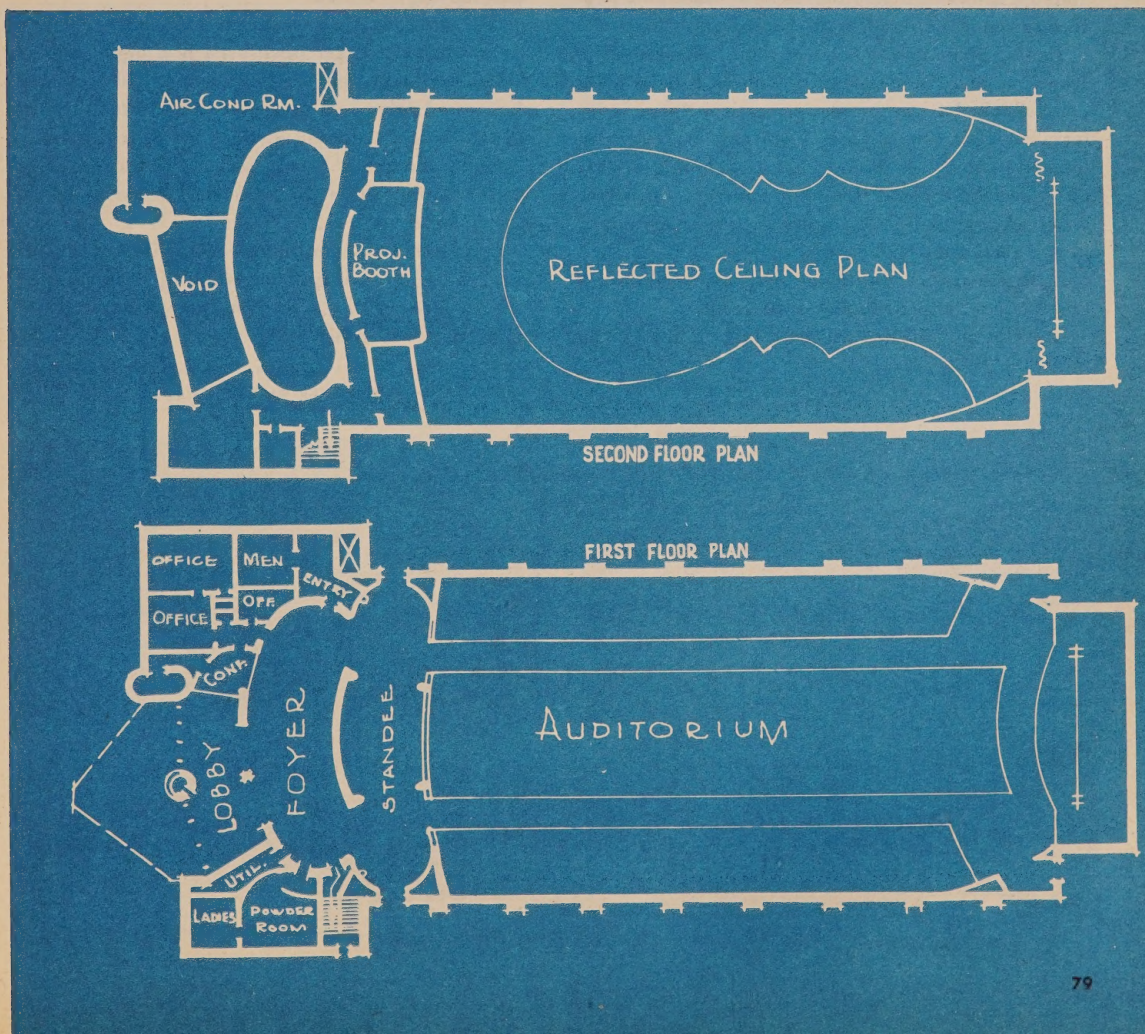
In addition to the offices, a sizable concession stand has been planned which will serve both the first lobby and the foyer.

The air-conditioning will be entirely by refrigeration.

Heating will be by gas boiler through steam coils.

Nine sisters and brothers are all interested in the theatre, and, for their convenience, special provision will be made for family use by placing alongside the projection room, in the form of a luxurious lounge, a room 10 feet by 15 feet with plate glass window, through which the owners can view their film product in complete isolation.

The decorative treatment of the interior will be of a classic modern nature with considerable baroque touches.



F & Y BUILDING SERVICE

Presents

The Esquire Theatre

Columbus, Ohio

Again using brick, terra cotta, and stone to good effect in accomplishing a pleasing, quality exterior is this proposed 1000-seat theatre, to be built for the Samson Operating Company. Actually four materials are used for, in addition to local limestone, Bedford sawed stone features the coping and trim.

Adding quiet dignity and a center of interest to the front is a large and extremely wide buff terra cotta panel flanked on each side by vertical fluted ivory terra cotta pilasters with an ivory cap, and, in turn, flanked by stone sections; with a garden plot to set it off. Specially molded tree ornaments done in silver on a background of jet black are spotted to advantage in this terra-cotta panel.

A large marquee with name signs mounted on top in silhouette letters completes the front.

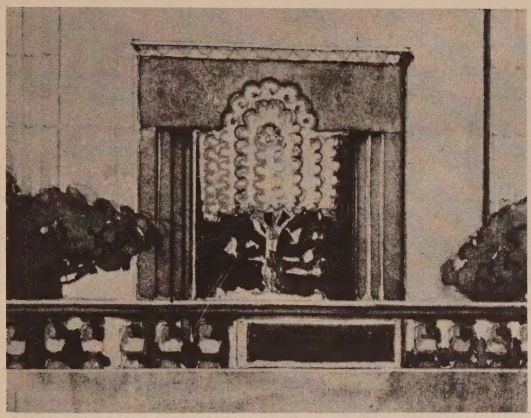
Entering this theatre will be a large lobby on the right side of which will be a sizable concession stand with adequate storage facilities. The sweeping curve of the lobby wall acts as a light barrier so that daytime opening or closing of foyer doors will never be obvious on the screen.

The inner foyer which connects to the standee area by means of a larger open arch is a high-ceilinged room, approximately 25 feet wide by 30 feet long. A recessed lighted ceiling panel and a 10-foot-high by 20-foot-long mural will set the general treatment.

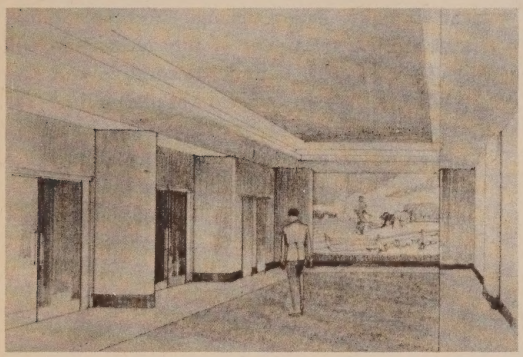
Men's and ladies' lounge rooms are entered off the standee area; while the manager's office is on the projection room level.

Completely air-conditioned both winter and summer, and set to quality standards of operation policy, this theatre should prove an interesting study in modern showmanship.

WHERE SPACE PERMITS, THE GARDEN PLOT IS WELL WORTH THE SMALL ATTENTION AND MAINTENANCE COSTS, AND USUALLY FURNISHES A PERFECT COMPLEMENT TO MASSIVE SURFACES OF THE MODERN FRONT.

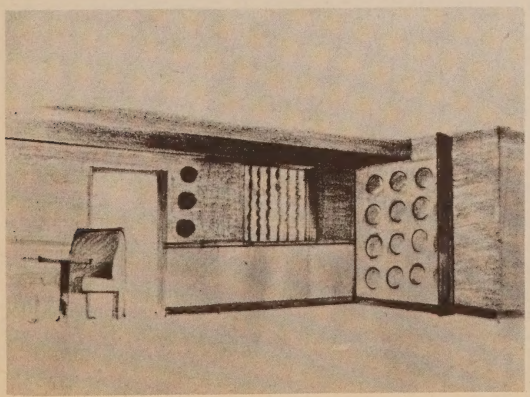


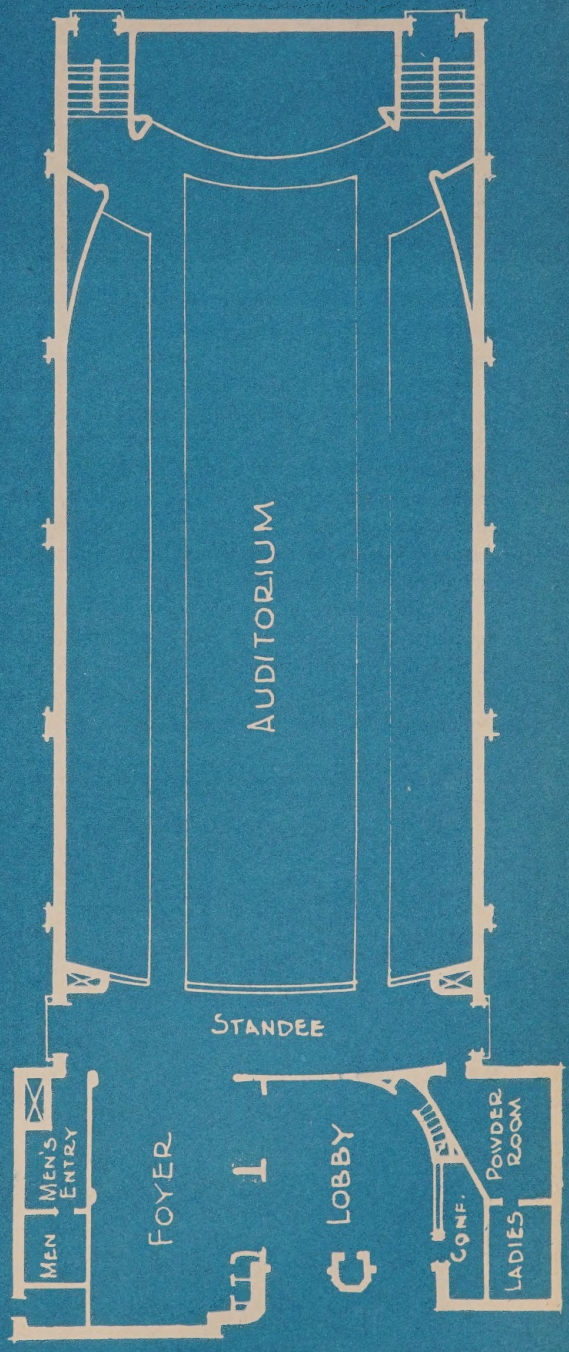
THIS CLOSE-UP SHOWS THE DETAIL OF A SILVER TREE ON A BLACK BACKGROUND AS IT WOULD BE VIEWED FROM THE ORNAMENTAL TERRA COTTA GARDEN WALL. THE DRAPERY EFFECT OF THE DESIGN WILL BE MOST STRIKING.



NOTE THE RECESSED, LIGHTED CEILING PANEL AND THE LARGE, OIL-MURAL CANVAS, THAT FEATURES THE SIMPLE DIGNITY OF THE FOYER. THE LIGHT BAFFLES BETWEEN THE DOORS ARE INSURANCE AGAINST DAYLIGHT FLASHES.

THIS ARTIST'S SKETCH OF THE LADIES' POWDER ROOM SHOWS THE PLASTERED PLAQUE ORNAMENTED WITH A SERIES OF 12 CIRCLES IN HIGH COLORS AND THE GRILLE EFFECT BETWEEN THE LOUNGE AND THE TOILET ROOM PROPER.





F & Y BUILDING SERVICE

Presents

The Ludlow Theatre

Ludlow, Kentucky

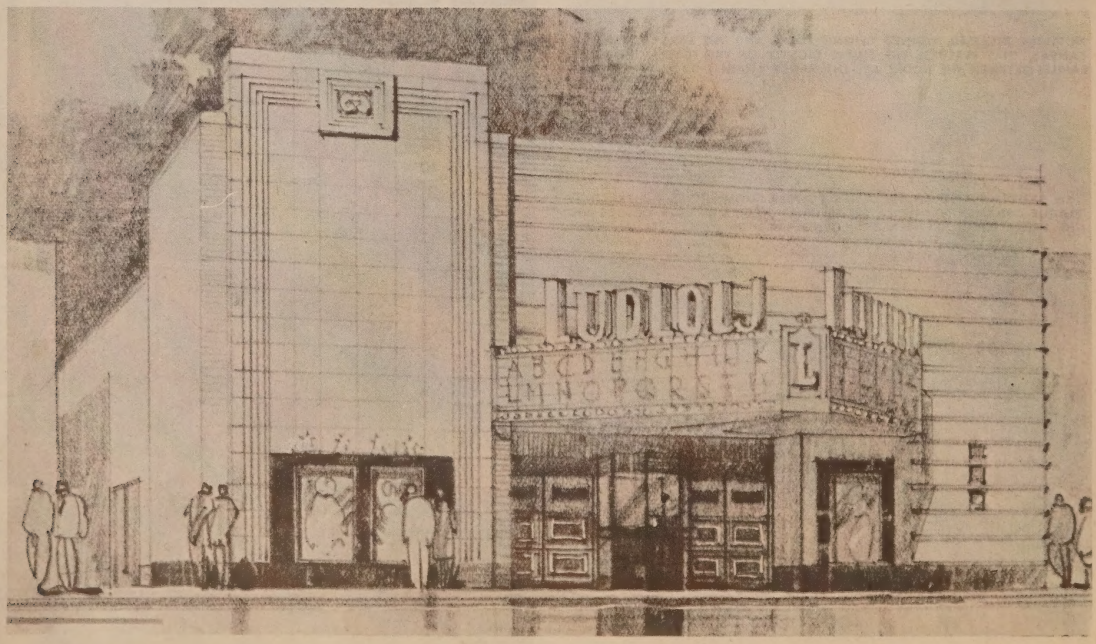
Designed for a typical small town, situated about 10 miles distant from Covington, which is part of the greater Cincinnati trading area, this theatre needed to embrace the serviceable needs of its rural location and clientele, while conveying a metropolitan smartness which would contrast favorably with nearby showhouses. While rural building codes and zoning restrictions are relatively less strict, the ordinary rules of patron safety and maintenance economy still dictate a quality of construction that will bring its own dividends in the years to come.

As a result, this theatre will cost without ground approximately $75,000 and would normally conform to all large city requirements. The walls will be of brick. The roof will be steel, with bar joists and metal decks covered with insulation, and built-up roofing. A concrete-base flooring will have all traffic areas covered with carpets or terrazzo. All-year air conditioning will be supplied through a combination of deep well water, filters, coils, fans and sheet metal ducts; with a gas-fired hot-water boiler and hot-water coils providing the winter heating. A modern underfloor tunnel will provide for the recirculation of air, with the air supply drawn through sheet metal ducts.

The acoustical treatment of the auditorium will consist of rock wool bats under decorative wall fabrics. All lighting will be by means of plaster ducts for an indirect effect.

In design of the exterior, this theatre will have a refined modern scheme. A rusticated brick facade will be offset with a tall terra cotta panel, capped by a specially designed ornament or decorative panel.

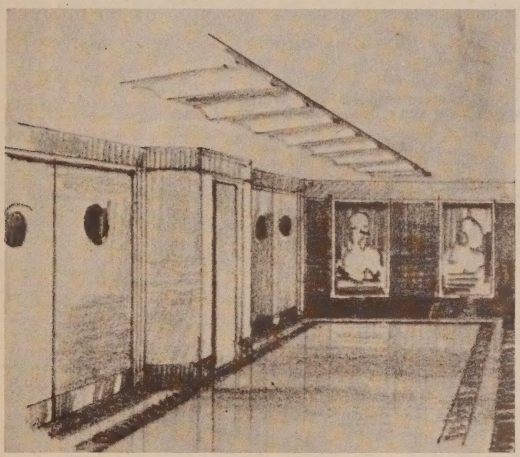
AN ADEQUATE MARQUEE IS TOPPED BY LARGE CHANNEL LETTERS IN MODERN STYLE WITH DOUBLE NEON TUBING WHICH WILL MAKE ALL THOSE WHO PASS BY CONSCIOUS OF THE THEATRE'S NAME AND LOCATION.



Reference to the interior floor plan will indicate the manner in which a sizable confectionery bar, complete with adequate storage spaces, has been worked into a light barrier to prevent screen flashes during daytime operation. The placement of this barrier also provides a selling location that it will be impossible for the incoming or exiting patron to overlook.

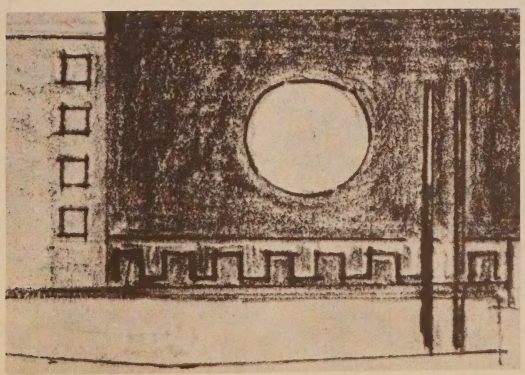
The normal men's and ladies' lounge rooms are entered directly from the standee area, with no space allotted to the usual foyer. A short pair of stairs from this same standee area gives access to the manager's office.

Fortunately for its later management, this theatre will be located on a large lot that will permit the development of adequate parking facilities. The latter is fast becoming an indispensable part of all, except big city first-run, operation.



AS PART OF THE SPECIAL ORNAMENTATION OF THE STANDEE SPACE WILL BE THE TWO LARGE INDIRECTLY-LIGHTED FRAMES, ADVERTISING COMING ATTRACTIONS. THE FLUTED PLASTER CEILING PANEL IS ANOTHER INTERESTING POINT.

AN EXAMPLE OF THE MANNER IN WHICH DECORATIVE WALL FABRICS WILL COVER THE ACOUSTICAL ROCK WOOL OF THE SIDE WALLS, IS SEEN IN THIS TYPICAL ELEVATION. FLAME-PROOFED CLOTH, MOLDINGS, AND PLASTER USED.



F & Y BUILDING SERVICE

Presents

The Madison Theatre

Covington, Kentucky

This 1350-seat theatre will replace the former Madison which was destroyed by fire in the fall of 1944. Situated in the heart of the business district of this city of 100,000, it provides an auditorium level seating 1000 and a balcony seating 350.

The general style of architecture is classic modern.

The front elevation will depend entirely on peach and blue terra cotta, with a massive center tower of illuminated glass brick forming the center of interest. Capping the tower in script neon will be the theatre's name. The marquee spreads out below the tower and will provide visual support to the three massive wings

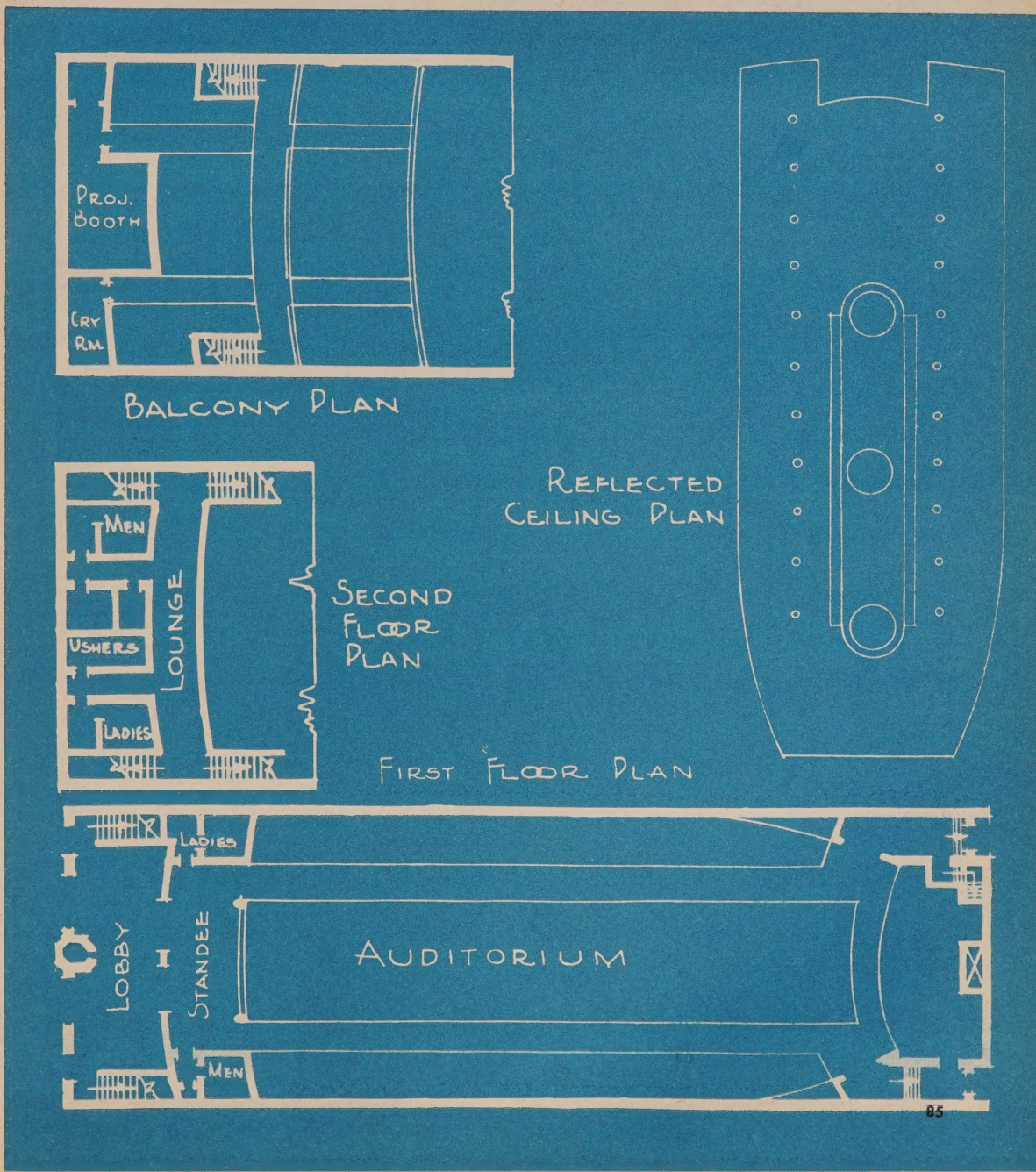
BELOW THE MARQUEE AN ESPECIALLY LARGE TICKET BOOTH WILL BE PROVIDED, FLANKED ON EITHER SIDE BY STRUCTURAL GLASS DOORS. THE UNDER-MARQUEE AREA WILL BE HEAVILY LIGHTED IN TRIANGULAR SETS.

of powder blue terra cotta that project outward from the central tower. Mounted on the marquee, 5-foot channel letters, in modern style and with double neon, boldly repeat the theatre's name.

To conceal the two double fire-exit doors, that would otherwise mar the appearance of the front elevation, poster frames and applied colorful ornaments have been used effectively.

A concession stand will be provided just inside the outer lobby doors with its front in paneled leatherette and a linoleum-covered top. Above the stand, a false beam conceals special illumination for the popcorn and candy display.

The beige terra-cotta wings of the front treatment are carried into the auditorium decoration by means of large plaster setbacks at the stage opening.



F & Y BUILDING SERVICE

Presents

The Troy Theatre

Troy, Ohio

Pfister and Maier, who operate the Mayflower in this live Ohio city, will build this additional 1000-seat theatre on an 82 by 160 feet lot at the edge of the expanding downtown business district. Of semi-fireproof construction, it is the objective to make this theater the city leader, with complete air-conditioning and all modern accommodations.

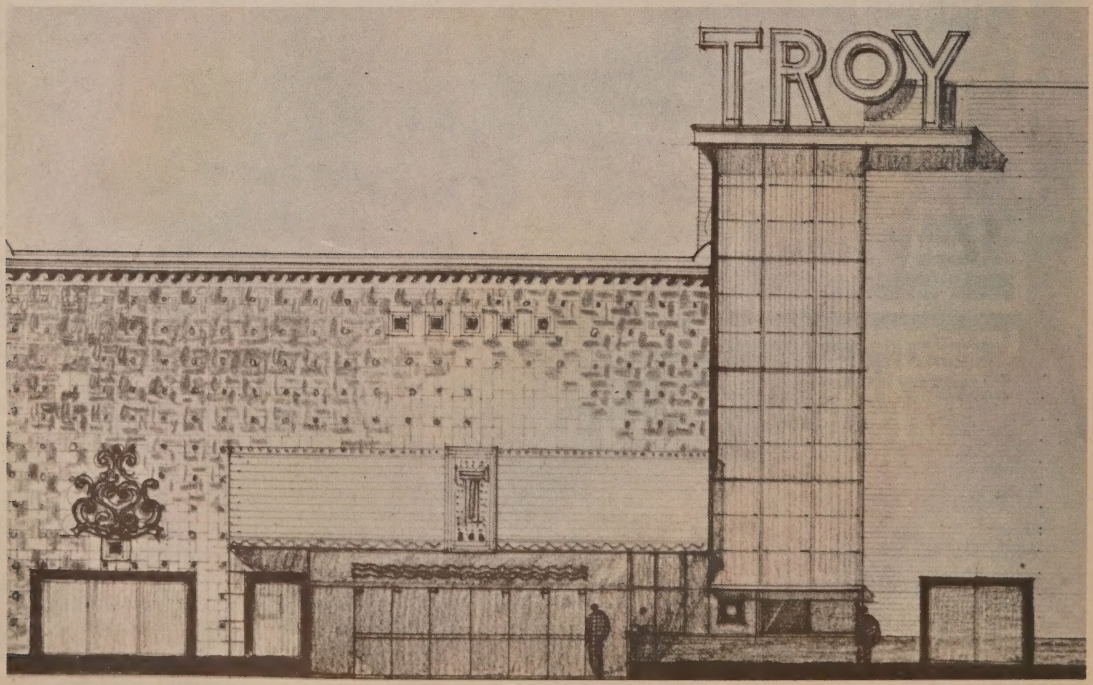
The front elevation is featured by glass doors and a huge glass semi-opaque fenestration of fluted green tinted glass 15 feet wide by 35 feet tall. The panel is capped by a massive projecting ledge on which the word "Troy," with triple neon in 3-foot-deep channel letters, is superimposed.

Among other features, the popcorn and concession stand opens on the street because of the traffic available for transient sales. Over the ticket booth a semi-opaque glass fluted panel, in a very unusual way, ties the ticket office into two general ideas of the fluted glass tower.

A sizable 6-track marquee will have a large letter "T" in neon surmount its apex.

Six large extruded aluminum poster frames are worked into the overall design. The entrance doors are proposed to be of structural glass, with the inter-

NOTE THE DECORATIVE INSET OVER THE DISPLAY FRAMES AT THE LEFT OF THE FACADE, AND THE MANNER IN WHICH IT OFFSETS THE SIMPLE TREATMENT. ALSO NOTE THE EXTERIOR SALES WINDOW OF THE CANDY BAR.

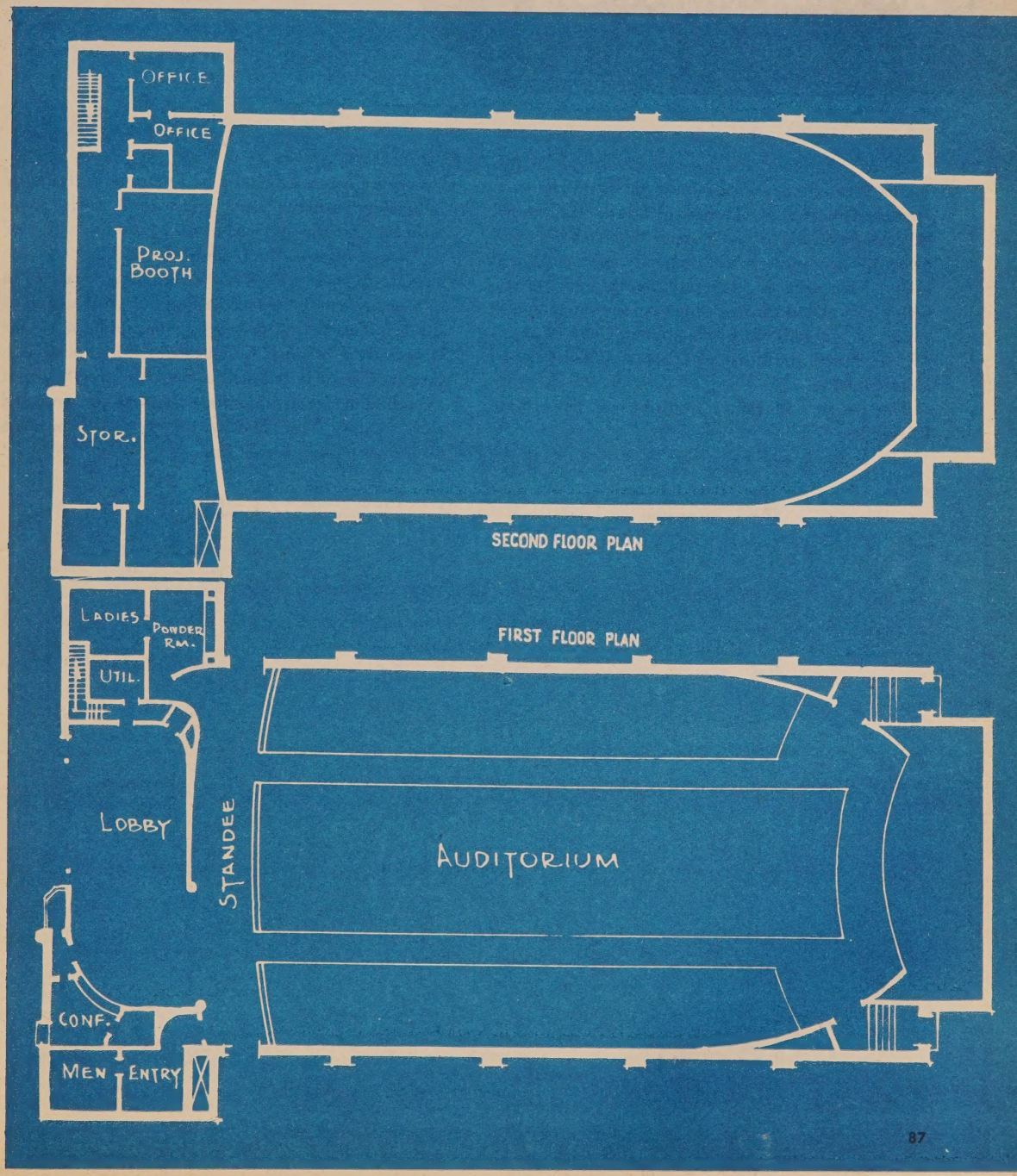


ior lobby wall acting as a light barrier to prevent daytime screen flashes.

To the right of the fluted glass tower-like section, a flat treatment of buff brick is applied to accentuate the ornamental effect of the tower. Above the tower, large 8 foot high letters make up the name sign.

All heating and air-conditioning will be on the second floor, where it is proposed to heat with hot water and cool with cold water from deep wells through the same system of coils.

A feature of the auditorium design is the ceiling treatment that is a series of step-down levels in ordinary plaster, draping themselves around a center channel which houses air diffusers of a special design.



F & Y BUILDING SERVICE

Presents

The University Theatre

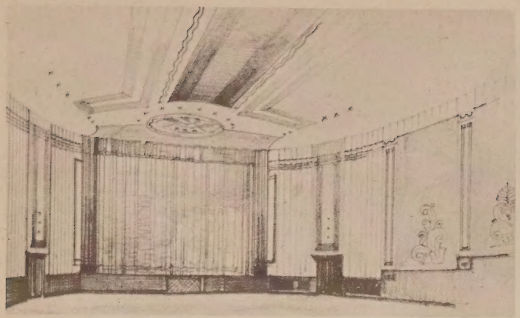
Columbus, Ohio

To be located in an extremely desirable location opposite Ohio State University on North High Street, this can be classified as a campus theatre which will be easily accessible to the majority of the student body. This area is currently being served by a severely outdated theatre which is approximately 30 years old. In addition to the student body of about 15,000, this is the heart of a residential district of about 30,000.

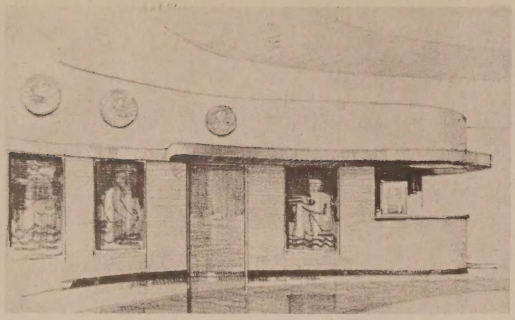
The design will reflect traditions of Ohio State University.

The front of the theatre will be carried out in the University colors of scarlet and gray, with the same colors dominating the interior design. A scarlet terra-cotta base treatment reaches up to the underside of the marquee across the front of the building. To the left of the marquee, deep fluted gray terra cotta pilasters rise to the top of the building without cap or coping. Across the top, and again emphasizing the University colors, will be four lines of high fired red. Centered in the fluted field is the sculptured figure of a football player in Ohio State uniform and designed to represent "Chic" Harley, the great All-American hero of the campus tradition.

TO THE RIGHT A LARGE NEON SIGN, WITH PROJECTING CHANNEL LETTERS, FACING BOTH DIRECTIONS AND SPELLING OUT THE NAME, AND A LARGE LETTER "O" AT THE APEX OF THE MARQUEE, COMPLETES THE EXTERIOR.



THE STAGE CURTAIN WILL BE GRAY WITH A HUGE SCARLET LETTER "O" IN THE MIDDLE. IN THE CEILING TREATMENT WILL BE THE GREAT SEAL OF OHIO STATE UNIVERSITY FORMING THE APEX OF THE LIGHT TROUGH.



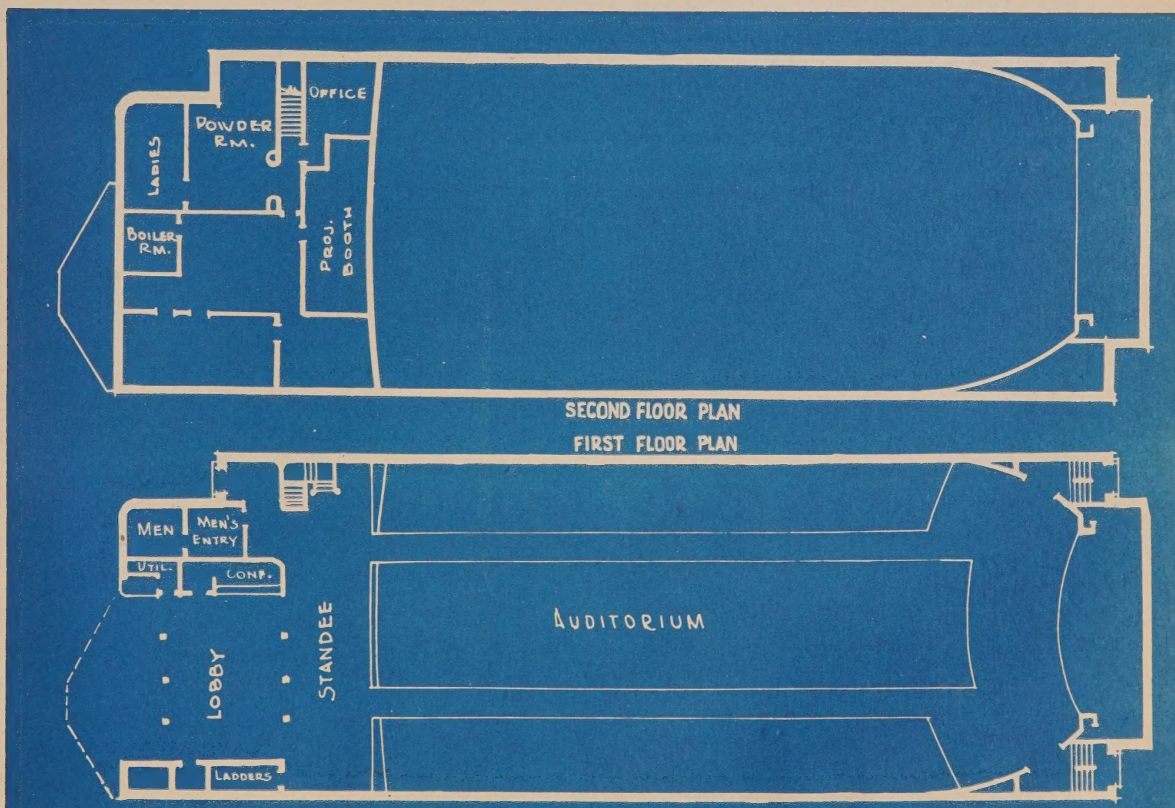
A CANOPY LIGHTING STRIP OVER THE LARGE CONCESSION STAND WILL DRAW ATTENTION TO IT AND TO THE PHOTOMURALS OF UNIVERSITY EVENTS. THESE WILL BE PERIODICALLY CHANGED TO PROVIDE INTERESTING DECOR VARIATION.

To the right and over the marquee, is a plain field of gray terra cotta, emphasized by five red spotted ornaments, and topped by a 30-inch high section of the fluted column treatment which will serve as a frieze capping the entire mass.

Featured in scarlet and gray, the auditorium walls will be divided by eight ornamented pilasters, with especially woven glass-cloth panels, and surmounted by an ornamented plaster frieze. A vertical, fluted treatment runs to a low base at the stage level.

This compact theatre will use mechanical refrigeration for air-conditioning purposes, and this equipment, together with a gas-fired steam boiler for heating, will be located on the second floor eliminating the need for a basement.

Interior of the lobby is provided with a sizable concession stand and a closet and storage space for marquee letters. The latter is provided just inside the lobby and under a special exit stairway which serves the second floor.



Post-War Sketches

from the drawing boards of

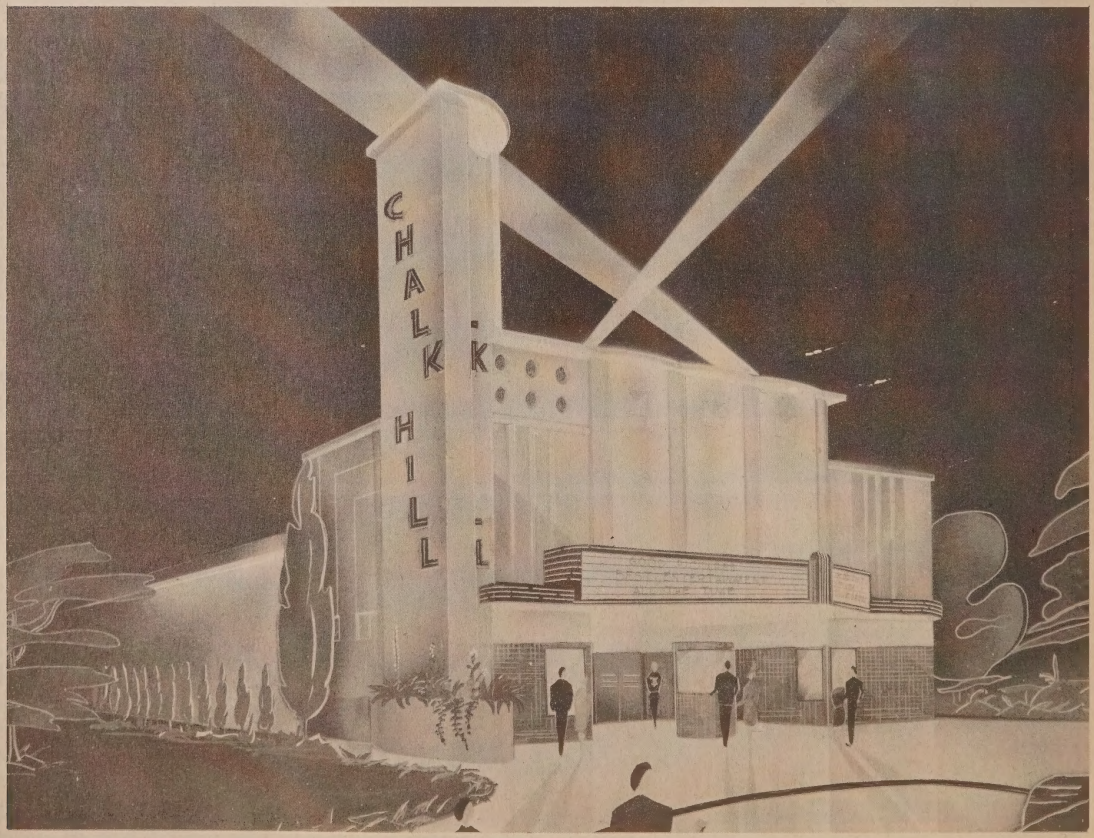
JACK CORGAN

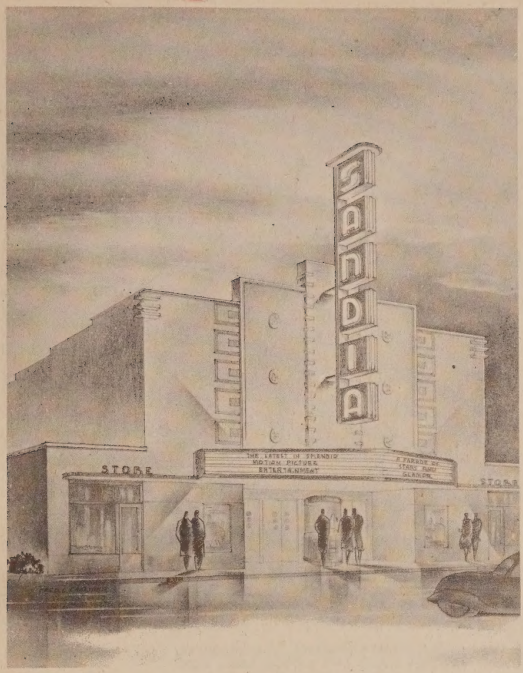
On the next few pages are illustrated a few of the current projects of one of the most active of the theatre architects in the South and Southwest. That these theatres are not rosy dreams but cinemas which definitely will be built is attested by the ownership, costs, and descriptions captioning each.

This new construction is keeping pace with the industrialization and population growth of the areas served, so that big things can be expected from it.

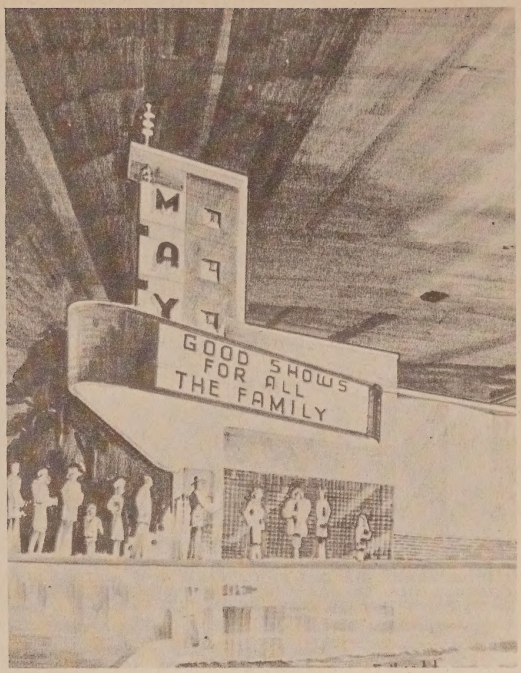
Fortunately climatic conditions are relatively mild, and the fumes and dirt of the large cities need not be taken into consideration, so that the use of stucco and other money-saving materials considerably reduce both first costs and exterior maintenance. This is reflected in all of the cost estimates, but the idea value exhibited is worthy of note.

CHALK HILL THEATRE, DALLAS, TEXAS, FOR UNDERWOOD AND EEZELL. LOT SIZE, 60 BY 160 FEET. SEATING CAPACITY, 950. COST, $50,000. STEEL FRAME, CONCRETE FLOOR, WOOD ROOF AND WALLS, STUCCO FRONT.





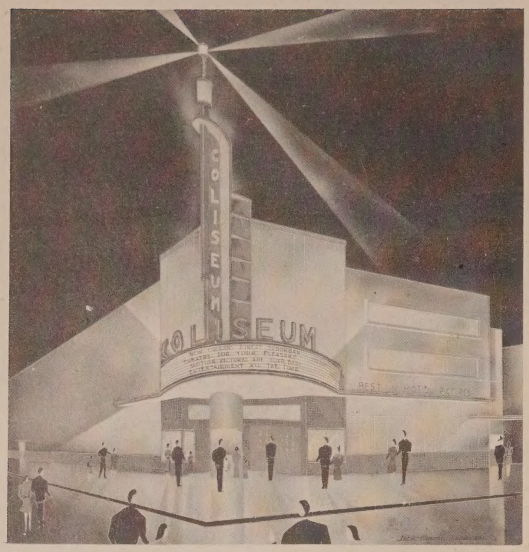
SANDIA THEATRE, ALBUQUERQUE, NEW MEXICO, FOR MARLIN BUTLER. LOT SIZE, 75 BY 160 FEET. SEATING CAPACITY, 900. COST, $65,000. REINFORCED CONCRETE FRAME, CONCRETE FLOOR, BUILT UP ROOF, AND STUCCO EXTERIOR.



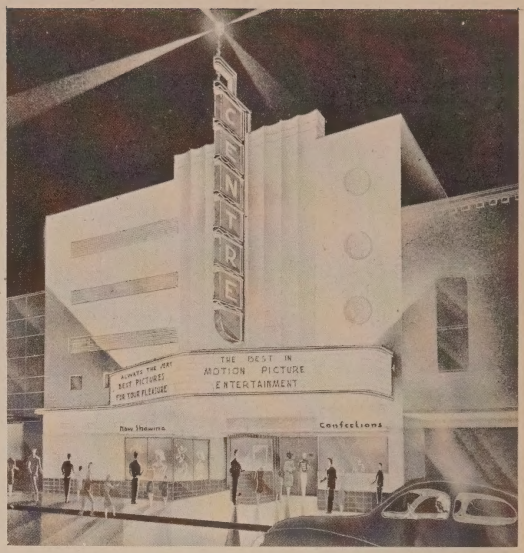
MAY THEATRE, OKLAHOMA CITY, OKLAHOMA, FOR GRIFFITH AMUSEMENT. IRREGULAR LOT SIZE, 62 BY 135 FEET. SEATING CAPACITY, 950. COST, $75,000. STEEL FRAME, STEEL ROOF, MASONRY WALLS, AND FACE-BRICK EXTERIOR.

HOO HOO THEATRE, GURDON, ARKANSAS, FOR K. LEE WILLIAMS THEATRES, INC. LOT SIZE, 50 BY 140 FEET. SEATING CAPACITY, 850. COST, $45,000. WOOD ROOF ON STEEL TRUSSES, MASONRY WALLS, CONCRETE FLOOR, STUCCO EXTERIOR.

THEATRE, MIDLAND, TEXAS, FOR J. GORDON HODGE. LOT SIZE, 38 BY 140 FEET. SEATING CAPACITY, 750. COST, $50,000. MASONRY WALLS, GYPSUM ON STEEL-JOIST ROOF, CONCRETE FLOOR, STUCCO EXTERIOR, AND WASHED-AIR COOLING.

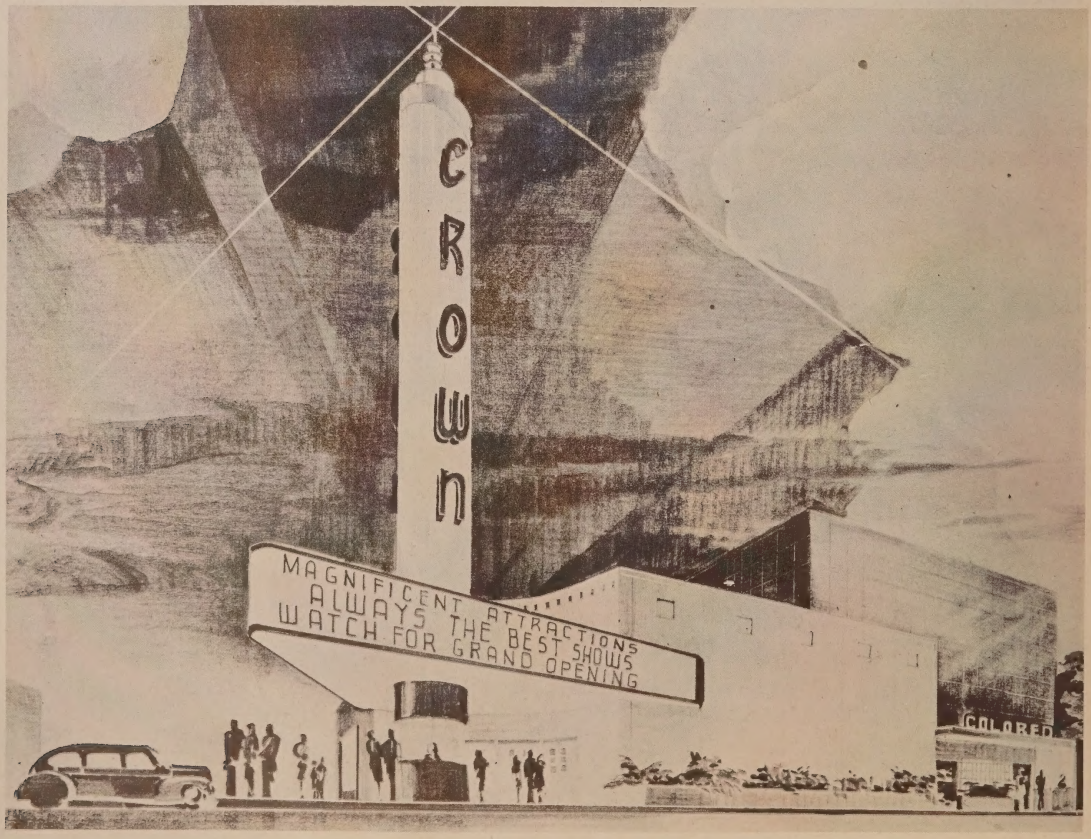


COLISEUM THEATRE, NEW ORLEANS, LOUISIANA, TO BE BUILT FOR HENRY LAZARUS THEATRES. LOT SIZE IRREGULAR. SEATING CAPACITY, 1,150. COST $45,000. PRESENT ROOF AND WALLS, CONCRETE FLOOR, AND STUCCO EXTERIOR.



CENTRE THEATRE, EL RENO, OKLAHOMA, TO BE BUILT FOR GRIFFITH THEATRES. LOT SIZE 50 BY 118 FEET. SEATING CAPACITY, 750. COST, $60,000. STEEL FRAME, MASONRY WALLS, STEEL ROOF DECK, AND STUCCO EXTERIOR. AIR-COOLED.

CROWN THEATRE, NEW ORLEANS, LOUISIANA, TO BE BUILT FOR HENRY LAZARUS THEATRES. LOT IRREGULAR. SEATING CAPACITY, 1,000. COST, $75,000. STEEL FRAME WITH MASONRY WALLS AND GYPSUM ROOF, CONCRETE FLOOR, STUCCO AND FACE-BRICK EXTERIOR. EQUIPMENT WILL BE OF THE LATEST DESIGN.



Post-War Sketches

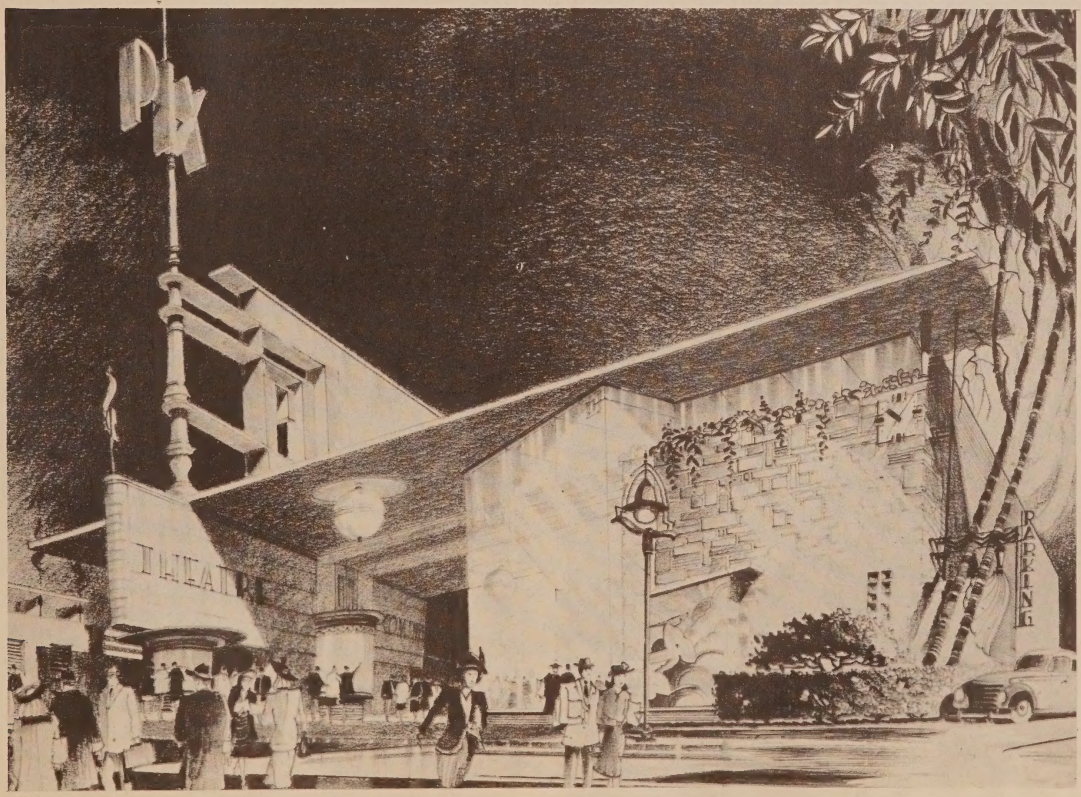
from the drawing boards of

S. CHARLES LEE

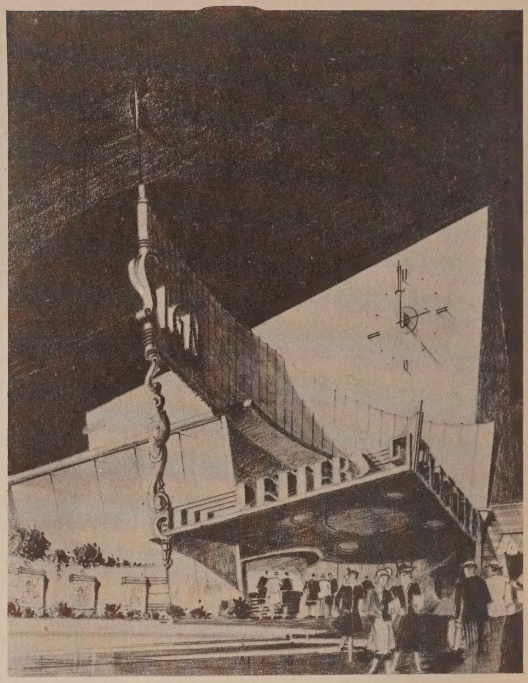
The West Coast has always been famed for its spectacular and theatrical architectural achievements and, as this particular architect has been one of the leaders and one of the most active in that area, his current sketches will warrant careful inspection.

Again benefited by the mildness of climate and the resultant adaptability of stucco, porcelain, glass, and plastics over a comparatively lightweight structure, some of the idea values would be prohibitively expensive to build or maintain in more northern climes or in smoky and dirty large cities. For the areas for which they are intended, however, they can be constructed and maintained economically and their attention-attracting qualities are obvious. Certainly no passer-by could observe any of these spectacular fronts without being conscious of the theatre.

THIS THEATRE IS DESIGNED FOR A RESIDENTIAL NEIGHBORHOOD OF MODERN CHARACTER AND WILL BE BUILT OF GLASS AND STONE, AND WILL BE EQUIPPED WITH ALL THE LATEST IDEAS FOR EFFICIENT OPERATION.



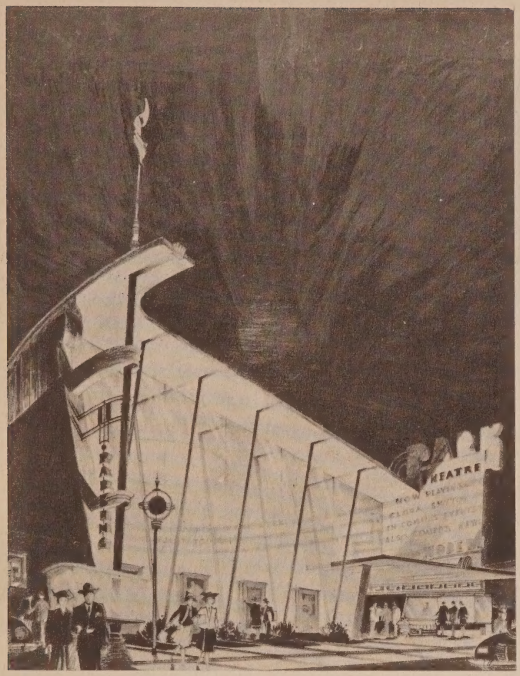
THIS MODERN IDEA HAS BEEN DESIGNED TO STAND OUT IN A BUSY LOCATION AND TO BE INVITING, ENTERTAINING, AND SMART. LETTERS IN THE SIGN WILL BE CHANGEABLE FROM INSIDE, A NOVEL APPROACH TO THE PROBLEM.



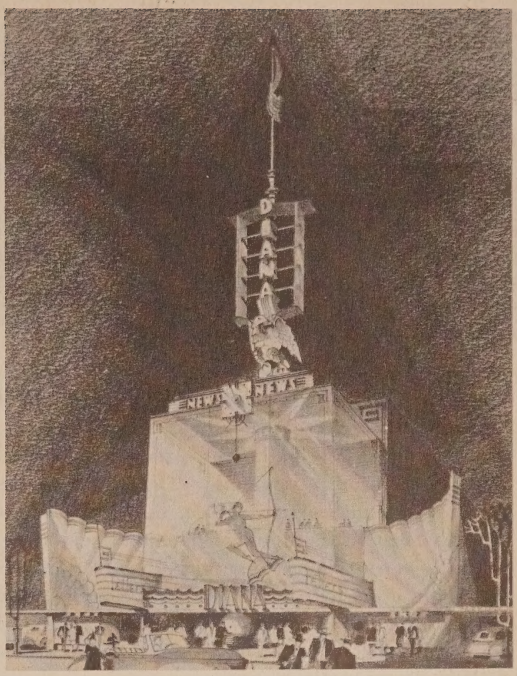
BUILT WITH A FRONT OF GLASS SO THE ENTIRE LOBBY MAY BE VIEWED FROM THE STREET, AN INVITING ENTERTAINMENT FEATURE IS ACHIEVED. NOTE SPECIALLY DESIGNED POSTER CASES FOR EFFECTIVE DISPLAY OF CURRENT SHOWS.

THE EXTERIOR WILL BE OF CONCRETE, PLASTER, TERRA COTTA, GLASS, OR PLASTIC, FOR THIS ORIGINAL DESIGN MAY BE BUILT EQUALLY WELL IN ANY OF THESE MATERIALS. A CLOCK IS INCORPORATED INTO THE THEATRE'S DESIGN.

AN INTERESTING CORNER ENTRANCE SCHEME AND FANTASTIC SIGN ARRANGEMENT HAS BEEN PLANNED AS A STRIKING SOLUTION FOR A MODERN COMMUNITY. NOTE HOW THE CLOCK IS POSITIONED NEAR THE NAME SIGN.

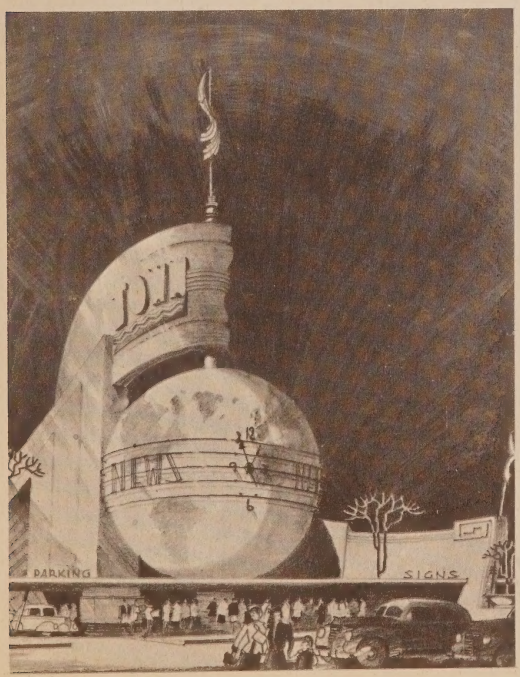


PLANNED TO REFLECT A DEFINITE APPEAL, THIS THEATRE WILL BE BUILT WITH A FRONT OF GLASS. THE NIGHT EFFECT WILL BE PARTICULARLY SPECTACULAR WITH VARICOLORED LIGHTS PLAYING ON VARIOUS PARTS OF THE GLASS FRONT.

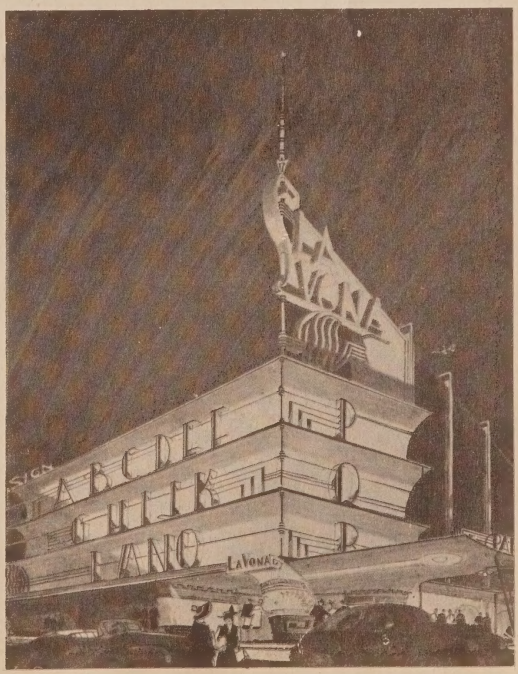


DESIGNED TO BE BUILT IN PLASTIC, THE UNUSUAL FACADE IS, THEREFORE, TRANSPARENT. TRUE TO ITS NAMESAKE, A NEO-CLASSICISM PERMEATES EVERY DETAIL. PLASTICS WILL OPEN NEW VISTAS IN THEATRE DESIGN OF THE FUTURE.

PLANNED FOR A LOCALITY WHERE THE NEWSREEL HAS BECOME AN IMPORTANT ATTRACTION, THIS FRONT IS MEANT TO SPEAK UP TO THE PASSERBY AND INVITE HIM TO COME SEE THE WORLD'S EVENTS AS REFLECTED FROM SCREEN.



IT IS PLANNED THAT THIS THEATRE SHALL BE ITS OWN ADVERTISEMENT AND THE FRONT WILL SELL THE THEATRE. THE WHOLE WILL BE A BLAZE OF COLOR, USING THE NEW FLUORESCENT LIGHTING UNITS WITH MANY TELLING EFFECTS.



Post-War Sketches

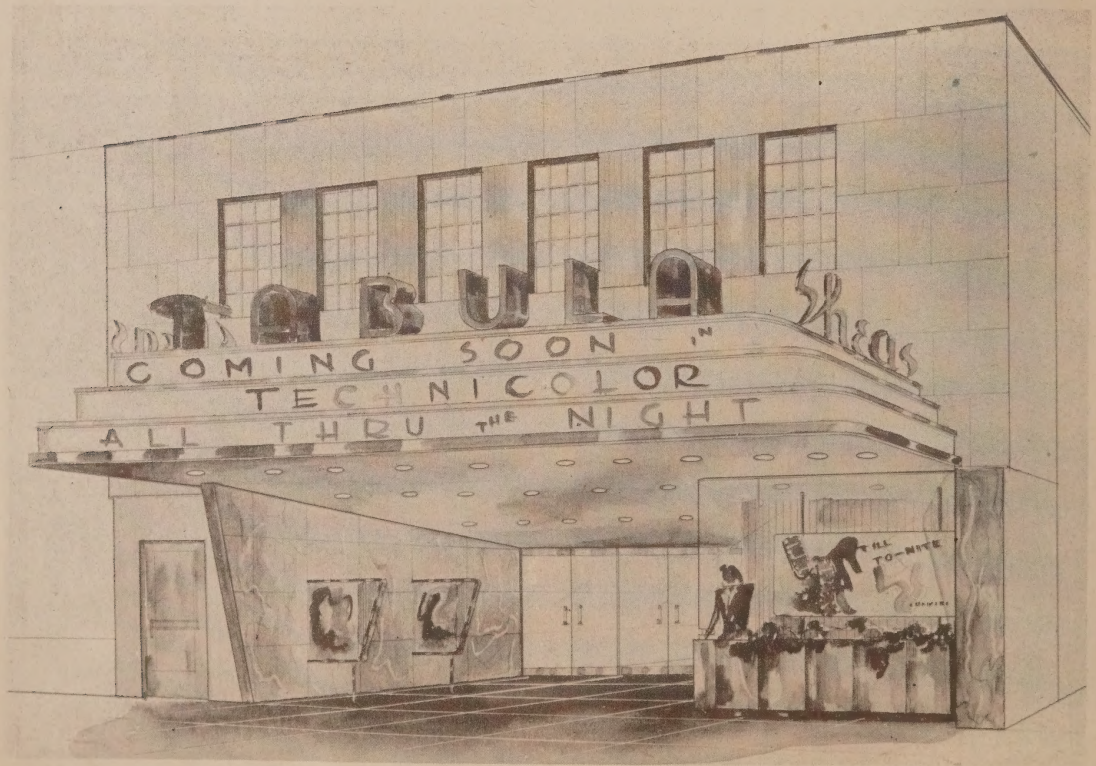
from the drawing boards of

MICHAEL DE ANGELIS

One of the most prolific of the eastern theatre architectural specialists has submitted these sketches of theatres that are either now in the process of construction or will be built just as soon as structural materials are again available. The past war has resulted in numerous population shifts in the East just as it has in the other sections of the country, with the result that many new theatres will be needed in order to bring entertainment closer to the greatest number of patrons. While this may result in the passing of some of the older theatres, the structural efficiencies and modern standards of the newer buildings can only improve the industry's already high level of excellence. Through such construction of new and passing or remodeling of old, the physical theatre continues to set the quality, safety, and patron-pleasing-service pace for the nation's public assemblage buildings.

Into each of the following has entered the knowledge and experience gained through many years of specializing in theatre properties, especially in the states of New York and Ohio.

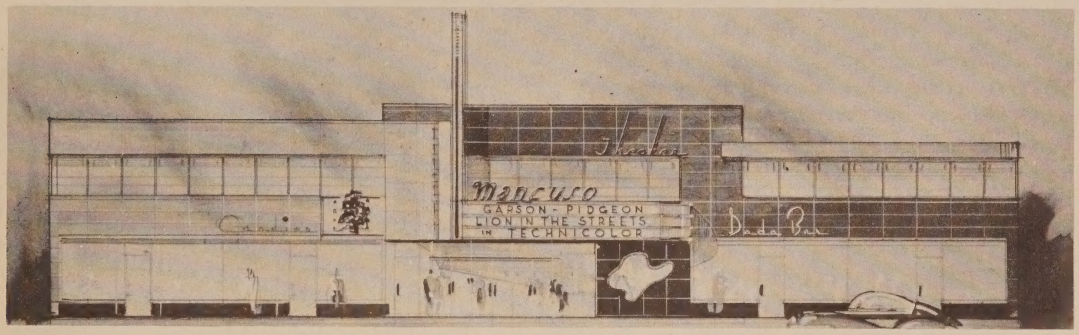
TABULA THEATRE, TO BE BUILT IN ASHTABULA, OHIO, FOR SHEA THEATRES, INC., WILL FEATURE MODERN SIMPLICITY AND AN ALL-GLASS LOBBY. NOTE THE PROJECTING DISPLAY FRAME WINGS FOR FORCEFUL SELLING.



STRAND THEATRE, TO BE BUILT IN ENDICOTT, NEW YORK, FOR C. & D. THEATRES, INC., WILL FEATURE TWO-TONE GLASS IN BLOCKY MASSES AND A TERRA-COTTA BASE. TWO STORES MAKE A BALANCED LAYOUT.

●

MANCUSO THEATRE, TO BE BUILT IN BATAVIA, NEW YORK, FOR MANCUSO BROTHERS, WILL INCORPORATE FOUR STORES INTO A PLEASINGLY BALANCED ARCHITECTURAL FACADE. THE AUDITORIUM WILL SEAT 1,600.

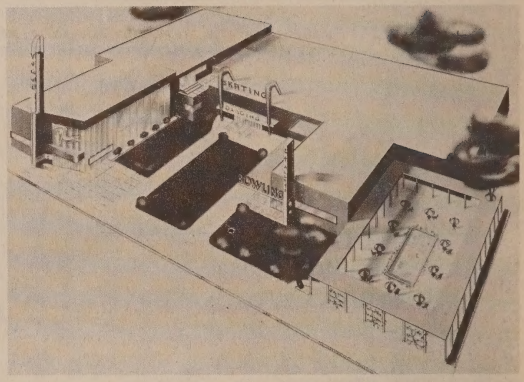


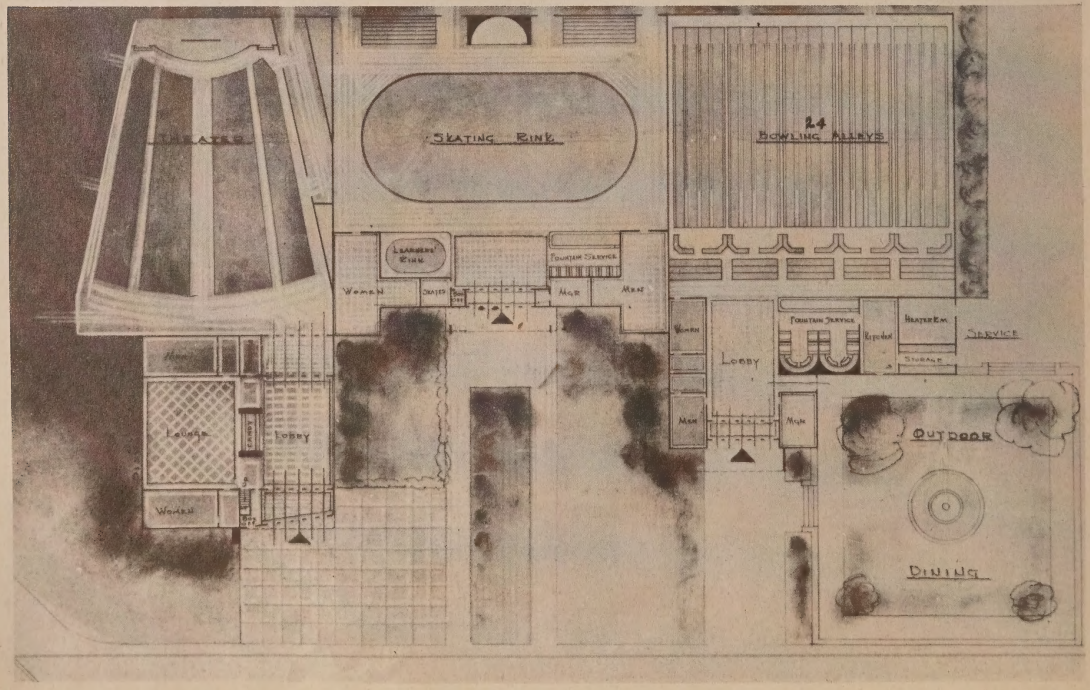
WELLMAN THEATRE TO BE BUILT IN HUBBARD, OHIO, FOR PETER M. WELLMAN IS PART OF A COMMERCIAL DEVELOPMENT WHICH INCLUDES NINE STORES. THE SECOND FLOOR PROVIDES FOR SPACIOUS OFFICES.

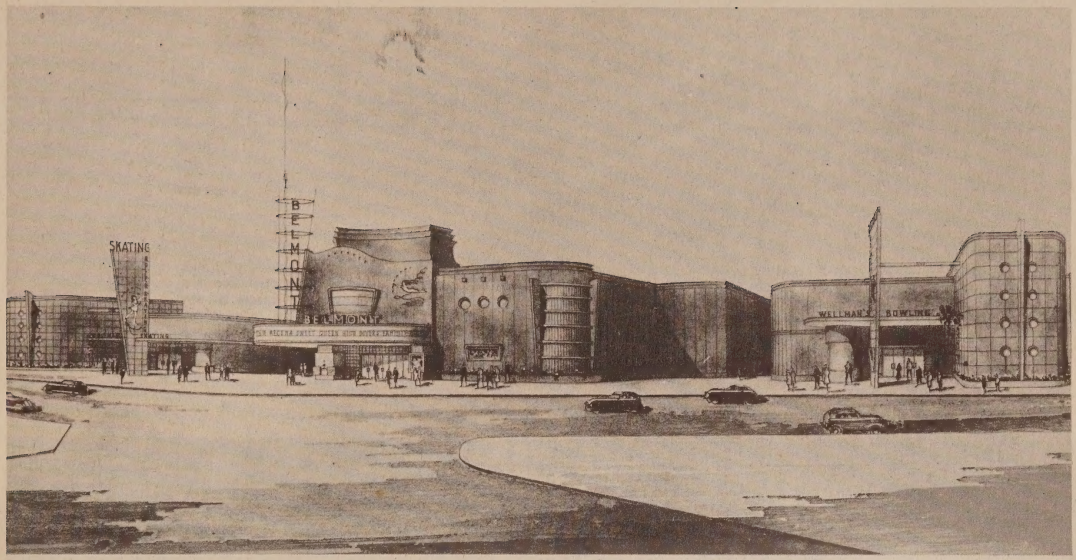
Recreation Centers
designed to expand
THEATRE REVENUES
in the Post-War Era

Since it is the largest segment of the entire entertainment field, playing to more cash customers each day than all other parts put together, it is only logical that theatre-industry planning should gradually expand into contemporary ventures. Where plot area permits, there is a certain efficiency to be acquired by pooling the patron services, patron attractions, qualities, and even some of the physical overhead of heating, air-conditioning, and night lighting, with kindred ventures, such as bowling alleys, ice skating rinks, night clubs, and so forth.

In the following sketches are several examples of proposed recreation centers which will have appeal to more than just motion-picture audiences.

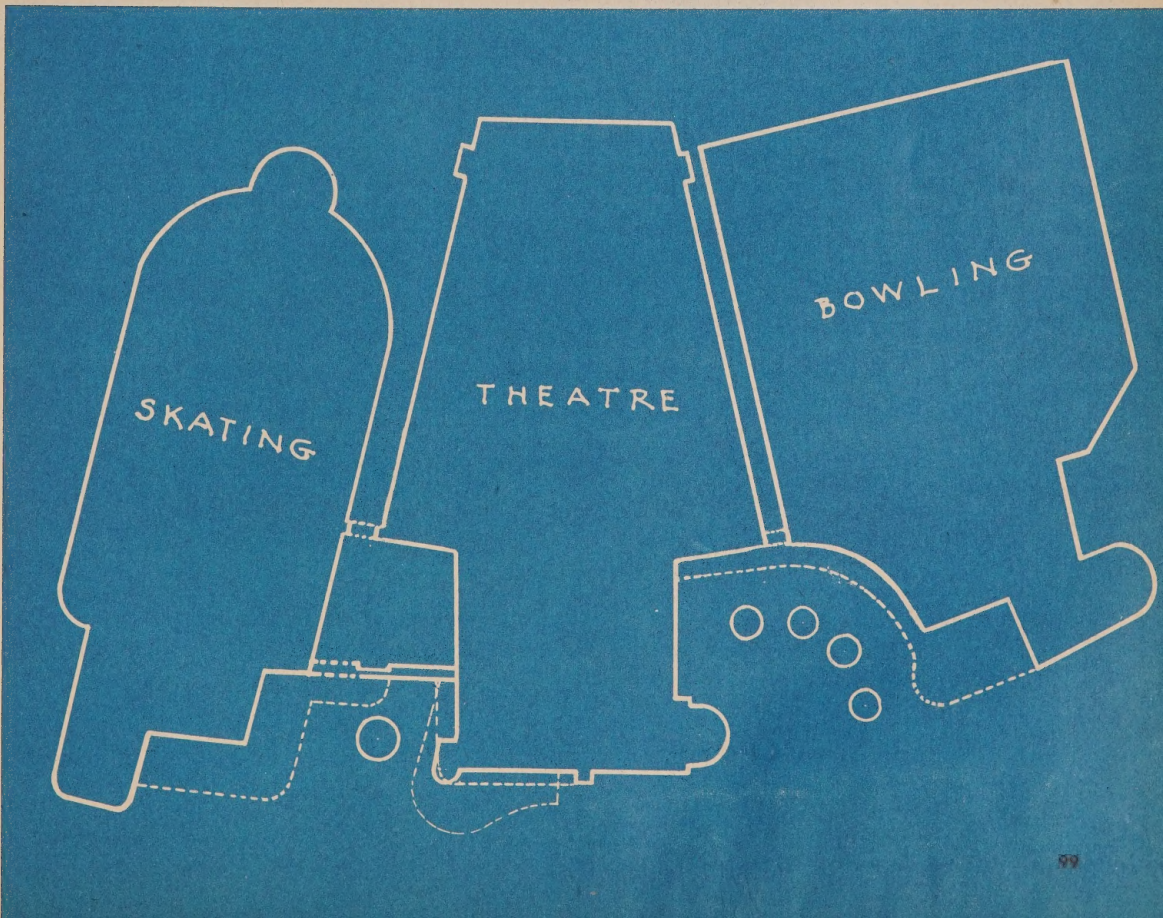


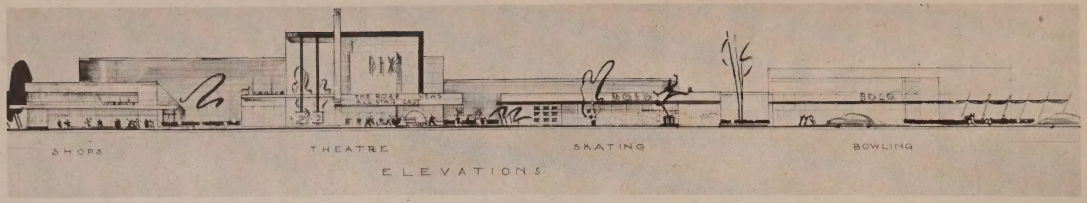




THIS PROPOSED PROJECT WOULD CONTAIN THREE INDEPENDENT UNITS WITH A COMMON ARCHITECTURAL TREATMENT TO UNITE THEM. SUCH A DEVELOPMENT IS CAPABLE OF DRAWING PATRONAGE FROM AFAR.

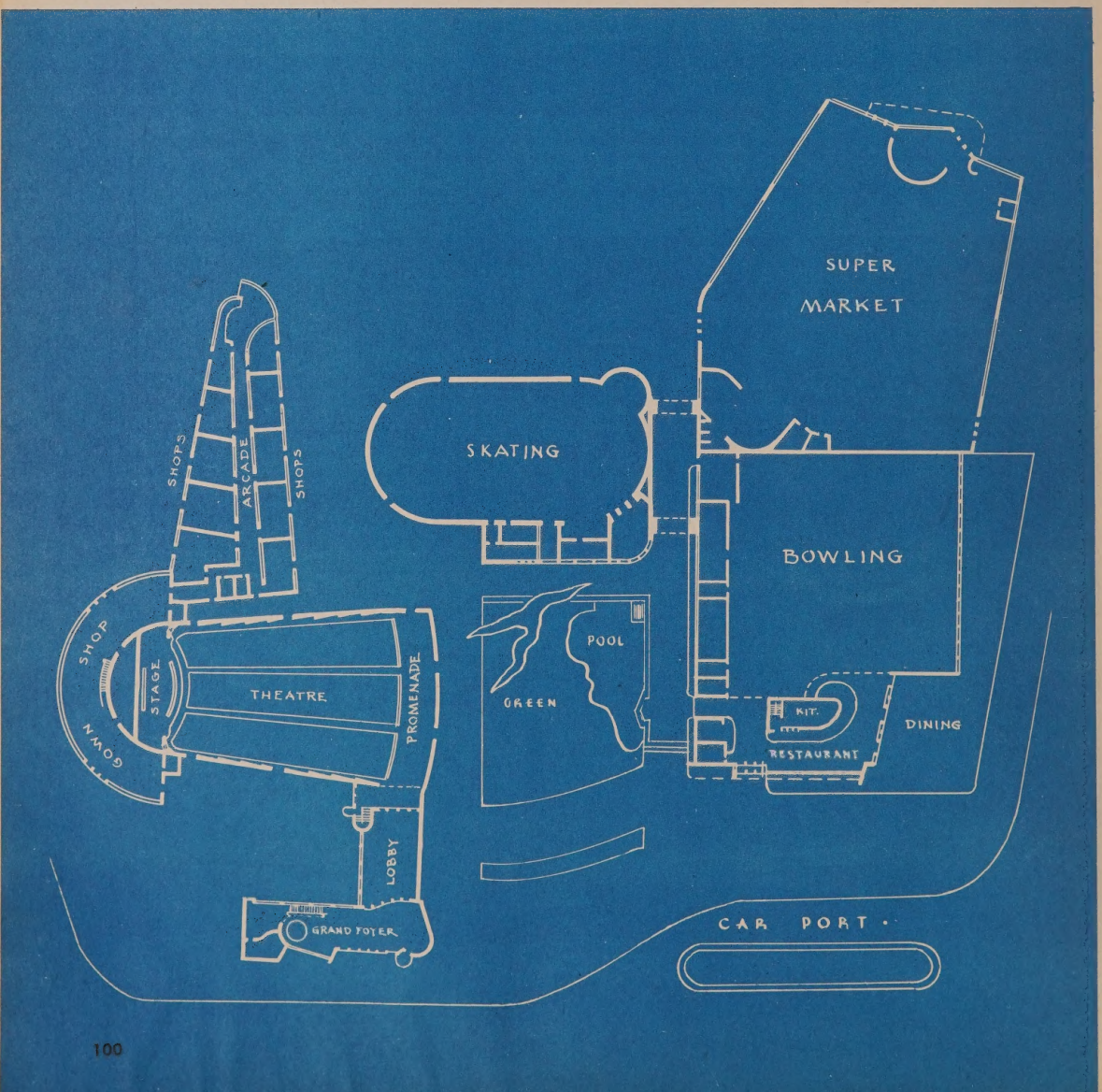
AS WELL AS SHOWING THE MANNER THIS ENTERPRISE SHARES THE LOT, THIS DRAWING ALSO INDICATES THAT IT CAN BE BUILT AS THREE INDEPENDENT UNITS AND AT ANY TIME. MICHAEL DeANGELIS, ARCHITECT.





ELEVATIONS

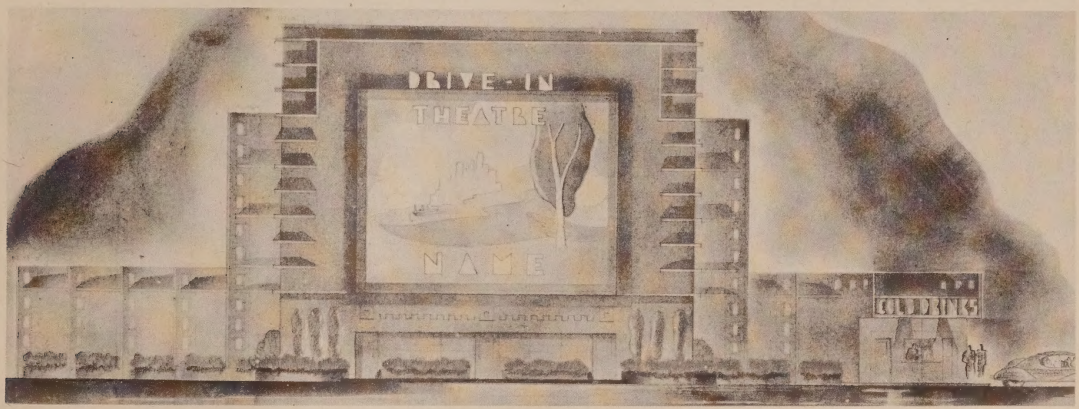
THE PLOT PLAN MUST BE LARGE AND FINANCING GREAT TO ACCOMMODATE SUCH A VENTURE AS HERE PICTURED; BUT IT IS OBVIOUS THAT THE SEVERAL INDIVIDUAL UNITS ARE CERTAIN TO HELP ONE ANOTHER. WHETHER THE PATRON HAS COME TO BUY A DRESS, GO TO THE MOVIES, SKATE, BOWL, EAT LUNCH, OR BUY GROCERIES IN THE SUPER MARKET; HE IS THERE, AND A POTENTIAL BUYER OF SOME ONE OR MORE OTHER COMMODITIES THE DEVELOPMENT HAS TO OFFER. JUST AS AVAILABILITY AND ATTRACTIVENESS HAVE BEEN MOST POTENT FORCES IN RETAIL SALES, SUCH A PROJECT AS THIS MAKES USE OF THE QUALITIES. AS TWO UNITS, THE TREATMENT AND PLOT ARRANGEMENT TIE THEM TOGETHER. MICHAEL DeANGELIS, ARCHITECT.



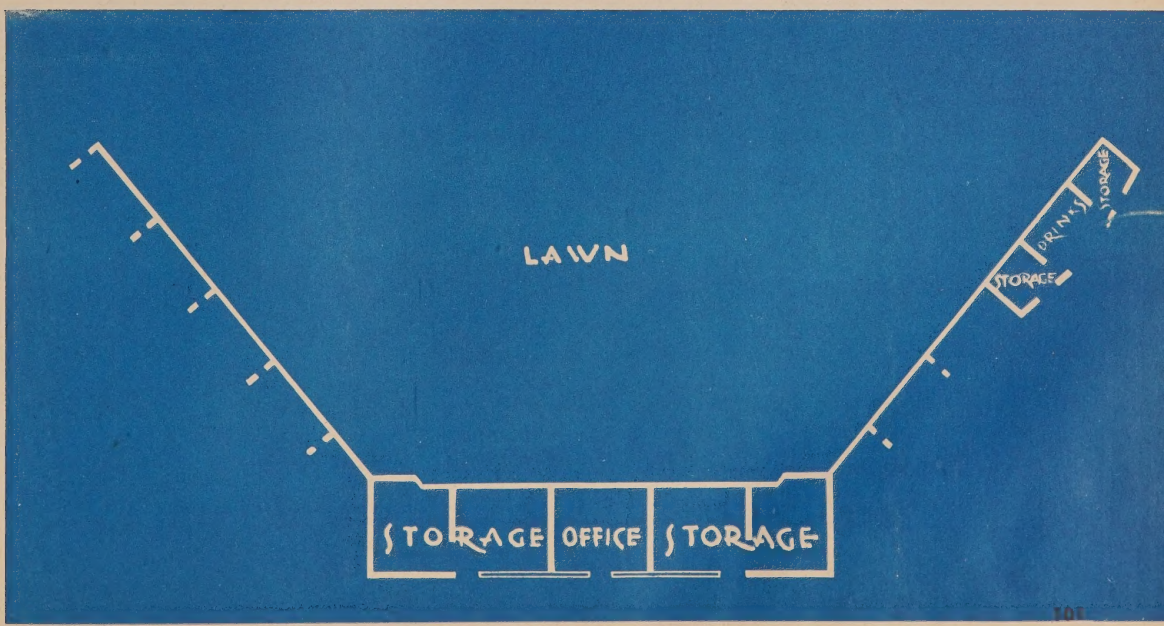
Open Air Theatres

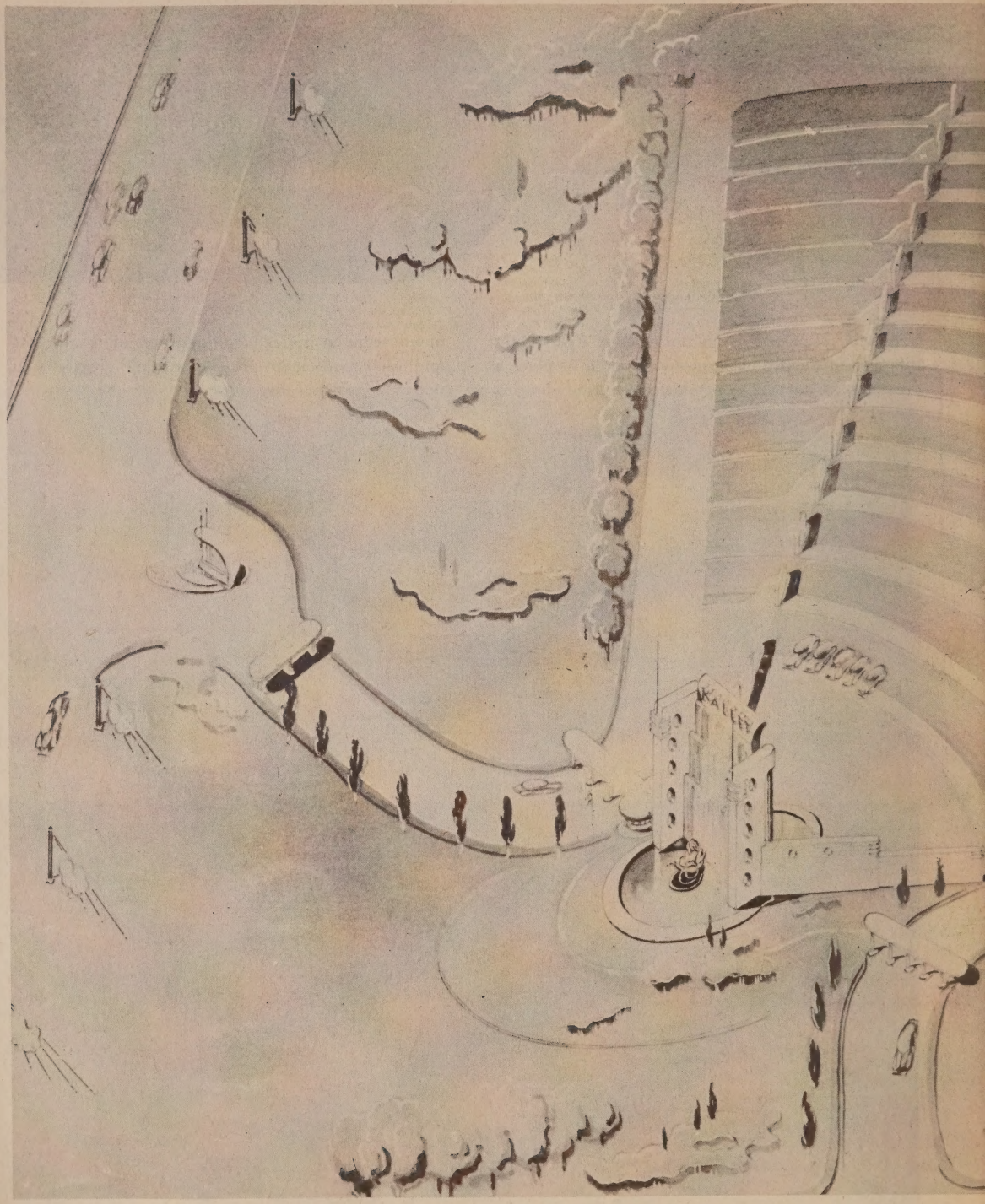
of the Automobile type will show vast improvement in the Post-War Era

Originally regarded as an unorthodox fly-by-night, this type of theatre has grown and taken its place as an accepted part of the industry. Recent developments seem to indicate the addition of restaurants and other amusement projects will add greatly to its patron drawing ability.

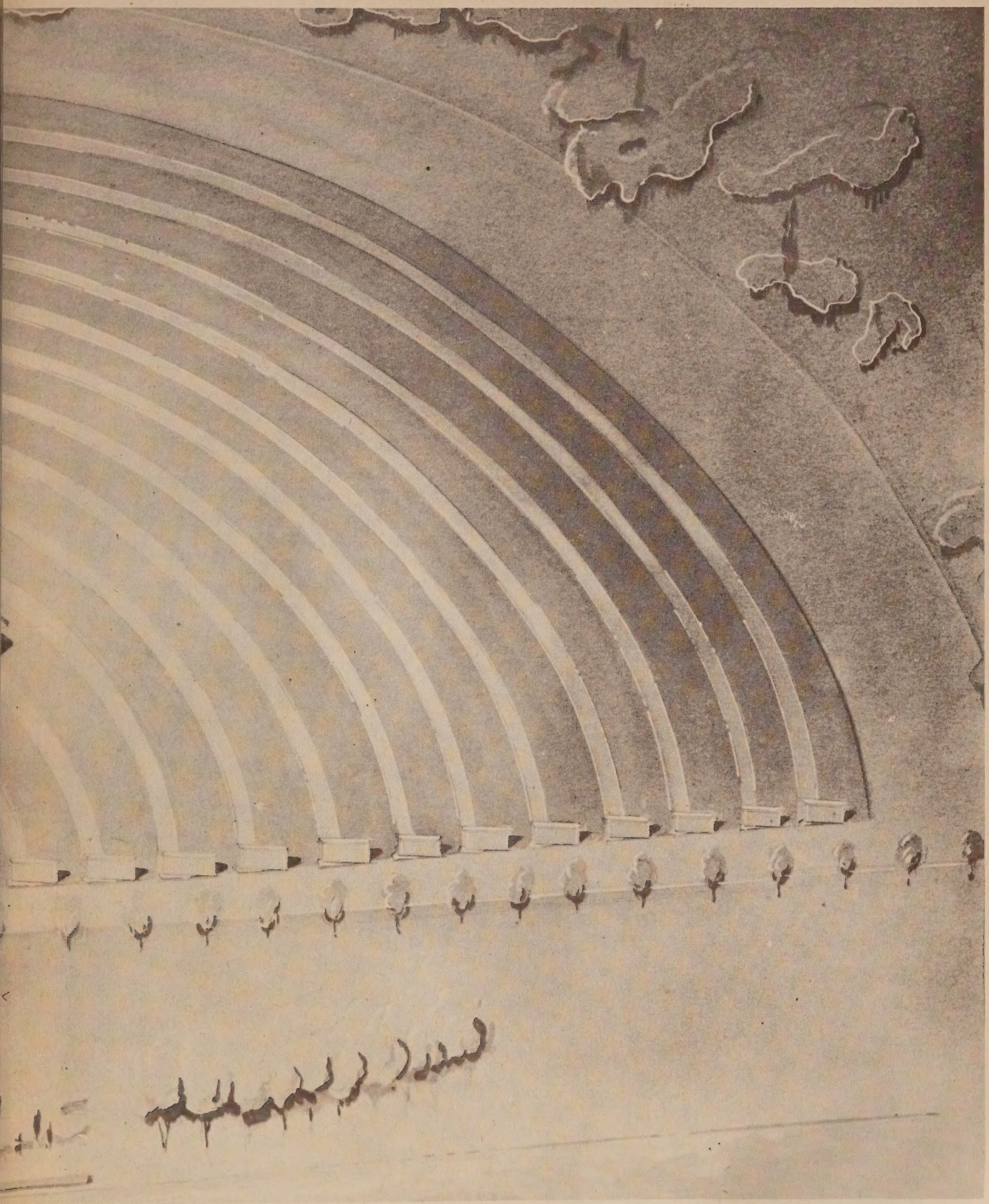


FROM THE BOARDS OF JACK CORGAN COMES THIS 452-CAR PROJECT COSTING $75,000. IT IS STATED THAT NINE OTHER THEATRES IN CITIES THROUGHOUT THE SOUTHWEST WILL BE CONSTRUCTED FROM THIS PLAN.



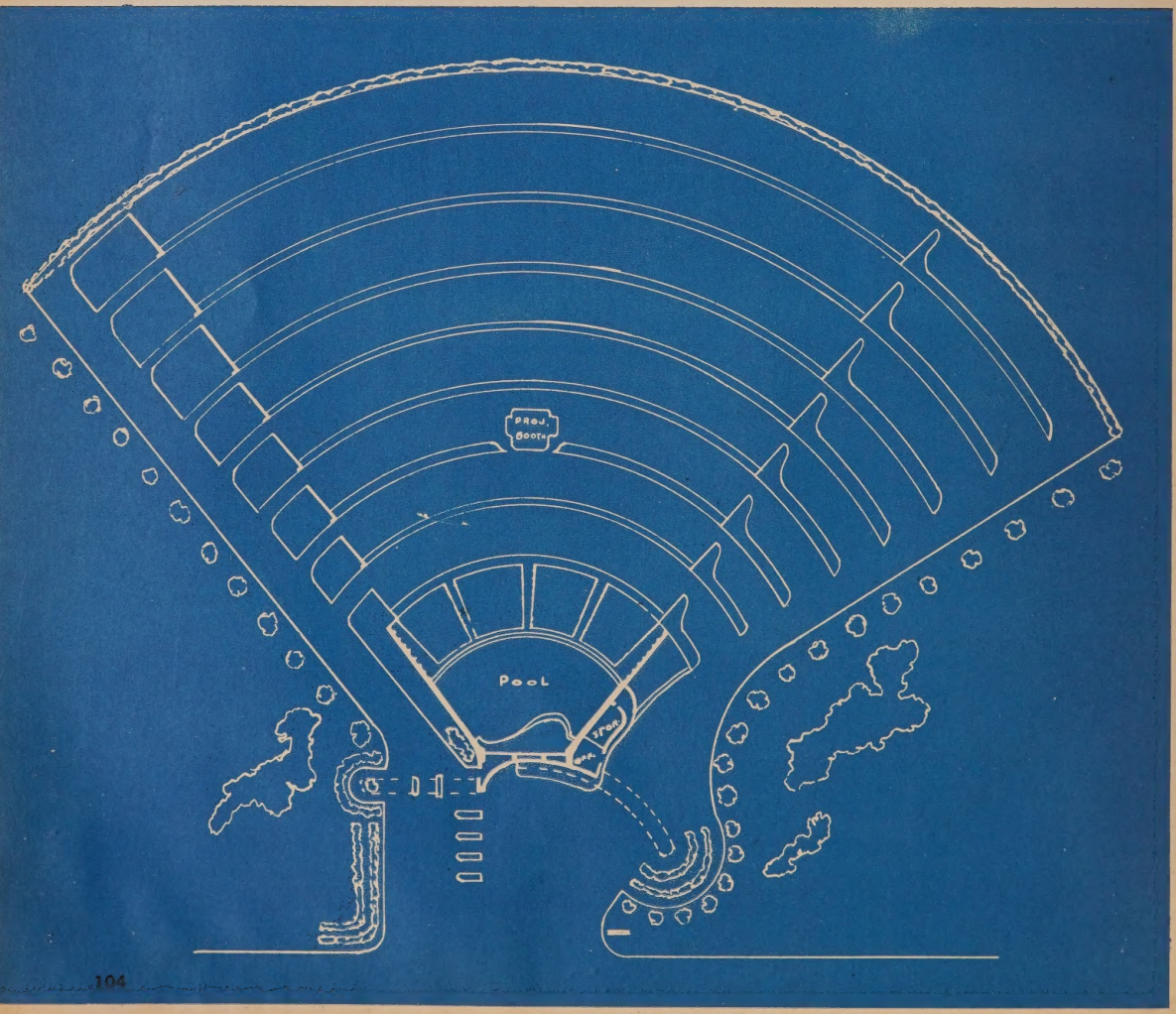


TO BE BUILT ON THE OUTSKIRTS OF SYRACUSE, NEW YORK, FOR THE KALLET THEATRES, INC., THIS 800-CAR DRIVE-IN HAD THE CONCRETE WORK AND GRADING COMPLETED AND GAS RATIONING FORCED ITS WITH-



DRAWAL. TYPICAL OF MOST OF THE DESIRABLE FEATURES OF THE DRIVE-IN TYPE OF THEATRE IS THE RAMPED "STANDEE AREA" AT THE LEFT. THE VERY UNUSUAL CLOCKWISE TRAFFIC COURSES ARE WORTHY OF NOTE.

FROM THE BOARDS OF MICHAEL DeANGELIS COMES THIS NEW AND VERY ELABORATE PROJECT TO BE BUILT FOR COMERFORD THEATRES, AND INTRODUCES A NEW DESIGN DEVELOPMENT. IN THE PAST, ONE OF THE MOST SEVERE HANDICAPS TO A DRIVE-IN THEATRE WAS ANY STAND-OUT LINE AT THE ENTRANCE OR ON THE STREET ONCE THE LOT WAS FILLED. FEW MOTORISTS WOULD JOIN SUCH A LINE SO THAT ONE "FULL HOUSE" A NIGHT WAS USUALLY THE MAXIMUM POTENTIAL. BY PROVIDING "STANDEE AREAS" AT THE END OF EACH RAMP, ALL WAITING CARS CAN BE TAKEN AWAY FROM THE FRONT AND, AS THEIR TICKETS HAVE BEEN PURCHASED AND THEY ARE IN ONLY A SHORT LINE, IT IS FORECAST THAT THEY WILL WAIT FOR "SEATS."



The New "Drive Over and Drop In" Theatre

New Type of Outdoor Theatre Is Presented With Angles on Project's Year-'Round Use

In the near future—probably the early summer of 1946—the car-owning population of Cleveland will have the opportunity to visit a new outdoor theatre. To the casual observer this theatre, somewhere within 30 miles of the heart of Ohio's largest city, will not be too much unlike other similar establishments of the type generally known as drive-in theatres.

However, the theatre will, in itself, present a detail of engineering and construction not found in any other similar theatre, and the over-all project will be one for all-year-'round operation and not merely as a summertime cinema.

A YEAR-'ROUND PLAN

That theatres of the drive-in type have been eminently successful—in the reception accorded by the potential clientele, no less than in the receipts—needs no elaboration at this point. But many an operator of a drive-in type of the theatre has, while making money on his investment, pondered the theoretical lost revenue because of the weather-induced cessation of operations during the four to six winter months of the year.

So it occurred, too, to William S. Ferguson, designer, distinguished architect, engineer, and inventor, of Cleveland. And thus it was that, in August, 1945, he formulated his ideas and drew his plans for an amusement development which should know no season where some part, at least, was not in operation.

The preliminary sketches—from which the illustrations of this article have been redrawn—reveal the idea of incorporating in the project a building under the stage, constructed as an integral part of the facade. This ground-level would house a night club, restaurant, or other concessions—and perhaps all of them!—together with the ticket booth and the center's administrative headquarters.

This feature of a ground-level building has an engineering advantage, too, as it materially assists in the construction of the screen supports, making a more rigid assembly.

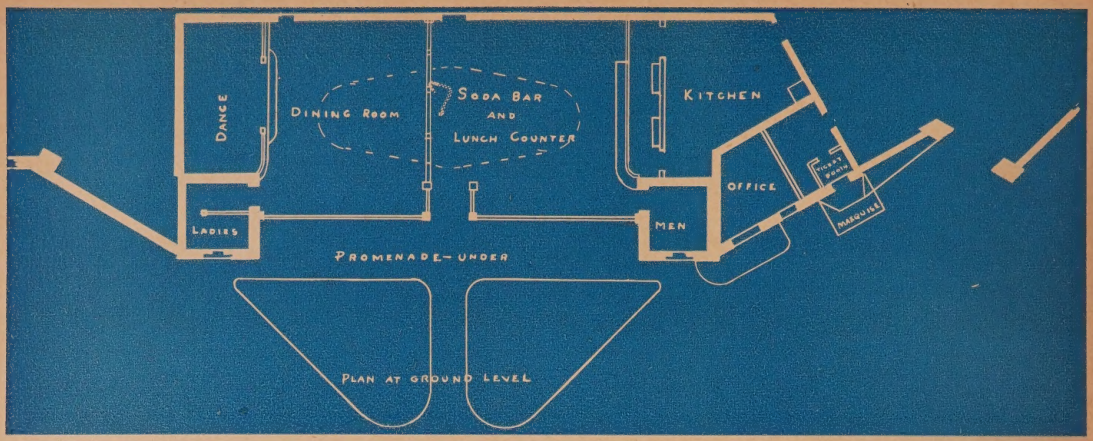
This idea of incorporating an amusement center with an outdoor theatre has other possibilities, such as, as shown in one of the drawings, tennis courts, basketball and handball courts, and a bowling green. Other amusements may be considered in such a project, such as providing for ice skating in the winter by flooding a certain portion of the field, and other recreational pastimes. And, of course, certain types of stores are naturals for this type of development. In the summer, outdoor restaurants could be an attractive feature. There are no limits to the ramifications of the idea.

Becasue all these "extra added attractions" are potential sources of revenue for year 'round income, financial institutions will loan a higher percentage of the total cost for a project providing

All architectural and engineering details mentioned in this article, as well as the term "Drive Over and Drop In," are protected by United States patents and copyrights, on which W. S. Ferguson reserves all rights.

All estimates of costs and income are those of Mr. Ferguson.

THE DRIVE OVER AND DROP IN THEATRE, as seen from the highway, is sketched here. On the ground level of the screen building, the recessed promenade can be seen, with the plate-glass windows of the dining and dancing portion of the pavilion creating the "come hither" appeal. At the left, snaking around the trees, is the drive used as "standing room only" when the house is filled, thus taking many of the customers' cars off the highway during the waiting period.



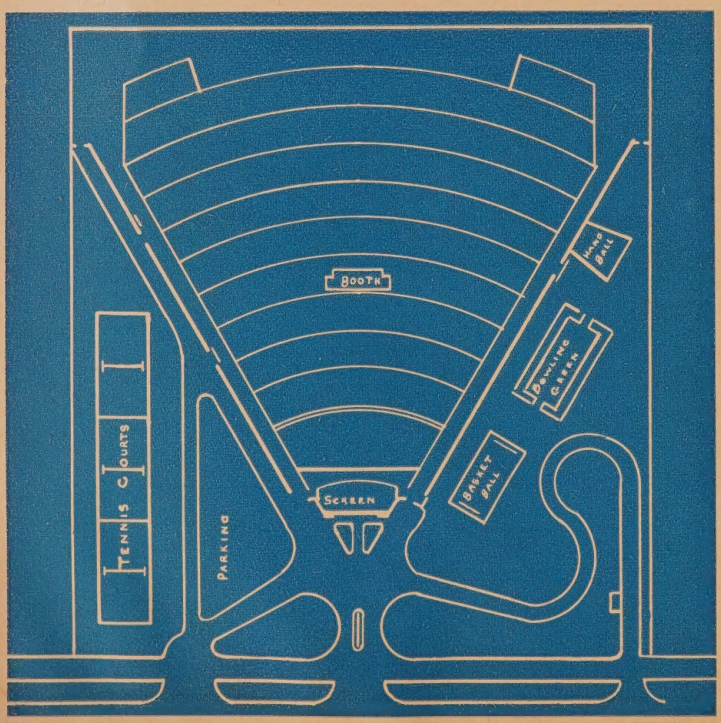
AN ALL-YEAR 'ROUND PROJECT is sketched in this drawing by W. S. Ferguson. Occupying the "base" portion of the screen building of a Drive Over and Drop In Theatre, provision is made for dining and dancing. It will be noted that the rest rooms are so arranged they can be entered from outside or inside the building. A substantial base structure like this, according to Mr. Ferguson, makes for a better screen superstructure. For other developments in connection with this project, see the other drawings. Lending agencies are said to advance a higher percentage of the cost when projects are operated all year.

stores and amusement centers than for merely a big signboard. In such a set-up as proposed here, these lending agencies will, as a rule, lend up to two-thirds of the entire project, including land, but excluding equipment.

"DRIVE OVER AND DROP IN"

The Ferguson invention relates to a parking area construction, adapted for the safe parking of automobiles on level or pitched surfaces, even in the event of faulty brakes or when the brakes are not set. While, of course, the invention can apply to parking lots, in senso stricto, it is of especial value in connection with open-air motion-picture theatres, and, where so used, the appellation "Drive Over and Drop In" may be applied to the parking area.

GROUND PLAN of a year-'round amusement project, as designed by W. S. Ferguson, is shown here (details of the dine-and-dance pavilion is given in another drawing). Here are indicated the outdoor sports areas which make the Drive Over and Drop In Theatre development a sports and recreation center. In winter time, it would be possible to flood a portion of the theatre's "infield" to provide additional revenue from a skating rink.



The invention is especially adapted for the accommodation of cars in outdoor motion-picture theatres, wherein the car is parked at a suitable angle for the spectators to view the screen. The automobile is driven to its position in a continuously forward direction, and is driven away also in a forward direction, thus avoiding the confusion and danger of accidents that may be involved with the type of construction that requires the automobile to be backed out of the pre-arranged, elevated stall.

Provision is also made for the automatic alignment of the automobiles in respective substantially parallel rows, so that the services of guards and ushers to bring the cars into alignment may be dispensed with, and the alignment thus automatically achieved insures a perfect viewing of the screen for all patrons on an exactly equal basis of car positioning.

The heart of the invention is a depression—approximately three inches deep—to receive the rear wheels of the automobile by means of continuous, or interrupted, channelways, or by means of individual wheel recesses suitably spaced in parallel rows in front of the screen. The rows need not be in rectilinear lines, but may be of arcuate shape or a combination of arcuate and rectilinear lines, all arranged in progressive series from the closest viewing position of the screen to the most distant positions for viewing the screen. The drop-in rear wheels raises the front of the car just the same as does a ramp under the front wheels. Any desired depth of drop can be provided at each individual drop plate.

The troughs, easy to install, can be made as separate drop-ins for the individual wheel, or they may be made continuous. They can be made of concrete,

A SCHEMATIC DRAWING of two cars in a Drive Over and Drop In Theatre, this shows how the drop-in channels cause the parked cars to be tilted at an angle sufficient for all occupants to see easily over the car in front. With the proper space between the cars, a slight depression makes a tremendous difference in the sight lines from any parked car. The slightness of the depression—hardly ever more than 3 inches—does not prevent driving the machine in any direction over the parking area, a point which the inventor considers of marked superiority over the present ramp type of construction in the usual outdoor auto cinema.

wood, metal, or any suitable material. If made of concrete, the troughs should be reinforced for expansion and contraction. They can be made in sections, if desired.

THE ECONOMICS OF BUILDING

By whatever manufacture, the troughs should be made strong enough to withstand a five-ton roller, which may be needed in case of repair to the paving.

Should it become necessary to pave the entire field, the troughs can still be placed to accommodate the cars.

There are many other features claimed in the patent application, all of which tend to reduce the final cost and increase the efficiency of an outdoor theatre of this type.

The cost of this type of installation is some less than for the ramp construction, because of the saving made by permitting all or the greater portion of the natural contour of the parking area to be maintained. Where the soil is suitable in its natural state for a parking surface, only the channels need be provided, and these can be constructed at very low cost. With a surface which may be traversed in any direction by maintenance apparatus or repair vehicles, there is no substantial expense involved in seasonal surface conditioning, and a large area may be taken care of in a minimum time.

In addition, the safety features of car anchorage and continuous forward direction of travel are recognized as distinct advantages to the patrons.

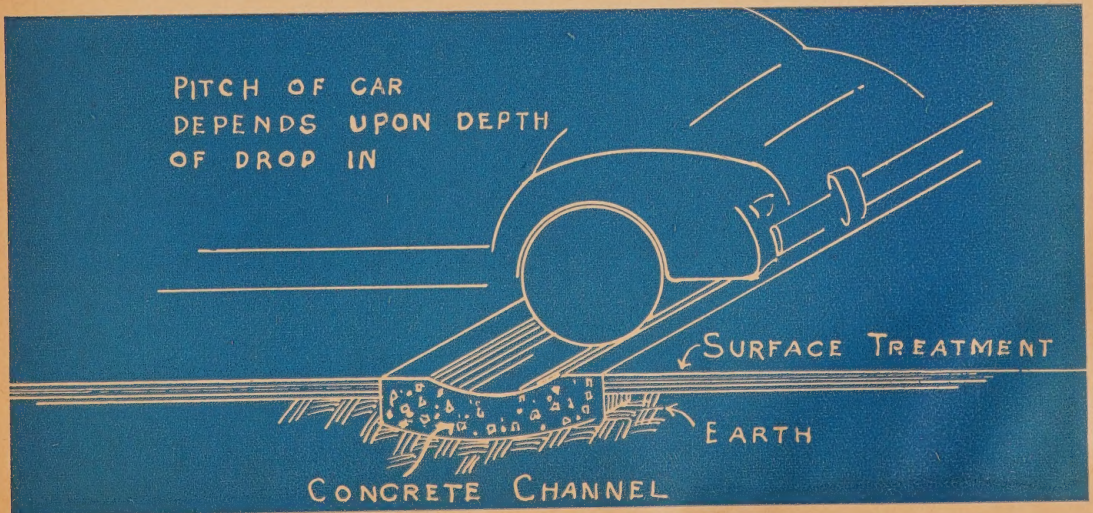
Another advantage of using troughs is that they may be used on a site having a pitch, either towards or away from the screen, thereby saving considerable grading. Besides preventing accidental coasting, a very special feature is that the troughs provide a means quickly to carry off all surface water to drains, or side troughs, thus eliminating much and sometimes all of a very expensive drainage system required by the use of other parking methods.

Cost of Project

The expense of any project must include every item, and all such expenses should be anticipated very accurately even before the land is purchased, since no two projects of like size and character will be exactly the same.

No outdoor theatre should be started without the services of a competent architect, capable of furnishing all pertinent facts relating to proper location. Based upon the population within a radius of ten miles, this must be sufficient to supply the requirements of the

THE DROP-IN CHANNEL is shown here in detail. Serving the purpose of improving drainage of the outdoor theatre's "auditorium," as well as providing a means for tilting the parked automobile, so that the car's occupants may see easily over the car parked in front, the channels are easily installed, being fabricated out of the best material at hand (cement is here indicated). The depth of the channel determines the pitch of the parked automobile, which is in turn dependent upon the natural contour of the area. The channels make it possible to reduce grading to a minimum, being able to be adjusted to the natural contours better than other types of construction, according to W. S. Ferguson. Construction and use of these channels are protected by patents.



proposed theatre, also construction costs, and so forth.

The initial cost of land, regardless how cheap, means nothing unless the property lends itself economically to the project, through the existing facilities and its contour. Grading may be a very important factor, as also the existing facilities, such as sewers, drainage, water, electricity, pitch of land, and so forth.

It is a comparatively easy matter to determine the construction costs. From very reliable estimates and actual costs of outdoor theatres previously erected, a 550-car theatre may be built, under ideal conditions and present-day prices, for approximately $70,000, including Drive Over and Drop In channels, lot grading, paving, fences around entire property, front housing or facade including screen, plumbing, sewering, electric wiring, painting, operator's booth, rest rooms, posts for sound equipment—in fact, everything complete, except outside drives, walks, landscaping, cost of land, cost of equipment, architect's fee, financing charges, legal expenses, and interest and taxes during construction.

To this $70,000 investment, the following estimated amounts must be added: Land, $5,000; drives and walks, $3,000; landscaping, $2,000; equipment, $13,000; miscellaneous costs, $2,000; and the architect's fee. A total of approximately $100,000 may thus be used for computing a potential profit.

Inasmuch as a project such as this involves the use of patented details, it is well to inquire into royalties and fees. Of his terms, Mr. Ferguson states, "For a limited time, providing any satisfactory client, interested in building a drive-in theatre using the Drive Over and Drop In system, retains me as architect and engineer for the construction of such a project (in accordance with the standard form of contract between owner and architect, as prepared by the American Institute of Architects, on a regular fee basis), I shall make no royalty charge nor require any payment for license fee for the use of the Drive Over and Drop In system. Should the owner of a proposed drive-in theatre desire to construct such theatre without my services, my charge will be $1,000 as a license fee for the construction of the drop-in channel and a 5 per cent royalty a year, based upon the gross receipts after all state and federal taxes are deducted, payable quarterly, unless other arrangements satisfactory to me are agreed upon."

Expense to Operate

The total expense to operate, of course, varies, depending upon good or bad management. Let us assume, however, an expense which includes the manager, film cost and delivery, operator, cashier, ushers, janitor for cleaning yard and premises, cleaning compounds, advertising, telephone, electric service, water, heat, insurance, tax assessments, and miscellaneous to be $677 a week—or for a season of 26 weeks, a total of $17,600 a year—not including interest or amortization upon the loan, the equipment or money invested.

Inasmuch as the equipment may be financed separately, the amortization and interest of a ten-year loan at 5 per cent would amount to $7,600 a year, making a total of $25,200, to which must be added the amount required to pay off the equipment account in three years of $4,160 a year, making a grand total of $29,360.

Income

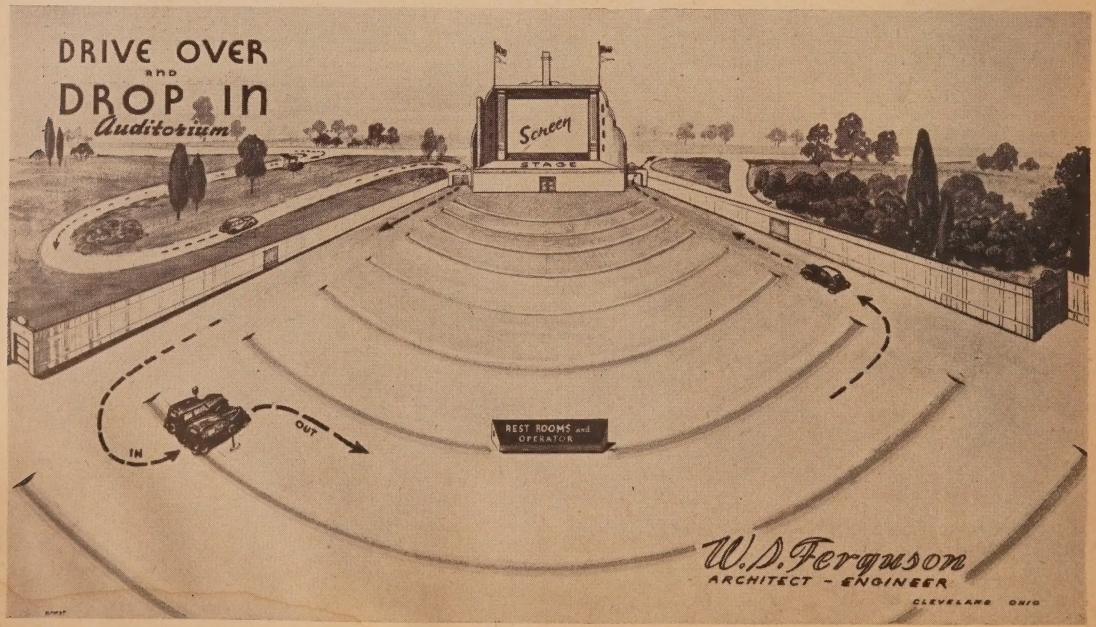
Through experience it has developed that 2.3 to 2.75 persons to the car is an average attendance to outdoor theatres. Assuming 2.5 for our proposition and an admission of 45 cents (37 cents without taxes), a 550-car auditorium would, if only 40 per cent filled at each performance, rate a net income of $1,424.50 a week; for a season of 26 weeks, $37,037, to which must be added the profit derived from the concessions; this has been found to amount to from 25 to 40 per cent of the net profit of the entire proposition, or roughly $7,000 a season, making a total of $44,037, not including rent of restaurant and other facilities. The rent from these facilities should be considered as a separate item, based on the cost of providing them.

Recapitulation

Income	$44,037.00
Total operating expense, including interest and amortization	29,360.00
Balance	$14,677.00

The above amount will be increased considerably after the first three years when the equipment is all paid for and the loan materially reduced, also if the project attracts more than an average 40 per cent attendance.

THE AUDITORIUM OF THE NEW-TYPE OUTDOOR THEATRE shows, in this sketch, the concentric arrangement of the drop-in channels, which serve to align the patrons' cars. The channels also serve to keep the cars from rolling on any incline should the brakes prove faulty or not set. Indicated by arrows is the route of ingress and egress from the auditorium area, showing that the car never backs, but always continues in a forward motion. Supplementary rest rooms are provided in the projection house. A stage is provided for civic celebrations and other events, and a seated area can be provided in the area nearest the screen.



Application of Color Dynamics to Theatres

Right Color Schemes Will Assure Patrons The Most for Thorough Enjoyment of Show

By HAYES QUINN
Color Consultant to the Department of Color and Design
Pittsburgh Plate Glass Company

FOREWORD

Modern theatre industry has reached many times into the past for some of the more amazing mechanical contrivances and processes which are today speeding production and showing of better and better pictures. The basic laws of science, mechanics, and mathematics, which great men from all ages have discovered and formulated, serve as guideposts for modern living. While such men as Euclid, Kepler, Huygens, Gallileo, and others concentrated their activities on highly technical and abstruce incursions into the realm of pure science, many of them found time to develop mechanical contrivances or processes which have ultra-modern application.

When the name of Isaac Newton is mentioned most theatremen probably conjure the picture of this eminent scientist sitting under an apple tree, watching the fruit fall earthward, and, from such occupation, proceeding to formulate the law of gravitational attraction and eventually the natural inter-relation of the component parts of the universe. But Newton should be remembered by the theatremen as an experimenter, and the discoverer of certain theories of light which have fathered the increasingly important science of color engineering. It was in 1936, approximately 280 years after Newton's first discovery of the visible spectrum, that research technicians first used color as a specific, that is, they reduced the measurable characteristics of color to a given formula so that certain prescribed effects could be obtained. Much of the knowledge utilized in these first attempts at using visible color as an actual tool was derived from nearly three centuries of activity in the field. Yet such use presented many complex problems which the color engineers had to solve before it could be compacted into a practical applicable form.

The practical results obtained with application of color according to scientific formulas of the principles of color dynamics are readily apparent in wartime industry. In hundreds of plants the energy of color is being used to promote efficiency and establish improved employer-employe relations. The use of color as a specific instrument is in its infancy and promises to be one of the more important considerations in charting the course of theatre decoration in the future. — E. D. P.

THE DYNAMICS OF COLOR

That color has certain power and energy is nowhere better illustrated than in the theatrical industry. No stage producer would present a musical extravaganza in settings finished in the sombre, colorless black, white, or gray tones, nor would a motion picture be made in black and white if it were possible to produce it in color. The tremendous appeal that full Technicolor presentations have over the conventional black-and-white is an indication of the fundamental attraction of color. This attraction is a manifestation of a basic appreciation that is common to all people. From childhood, when brightly colored toys are the chief attraction, to old age, when the magnificent hues of a sunset excite admiration, color exerts a profound power over human behavior. Investigate the reasons why a person chooses one thing over another and, somewhere along the line, the color factor will inevitably enter the picture.

Although one segment of the theatrical world, the producers, have recognized and used the popular appeal of color, the operators of theatres have not been as progressive in adapting color as an aid in improving the physical attraction of their houses. This has been largely a result of the fact that until quite recently little or nothing was known about the practical application of the power and energy in color. The remarkable discoveries made several centuries ago by Sir Isaac Newton concerning color and light were left undeveloped, except for academic classroom discussion, until less than a decade ago, when intensive experimentation was started in the color field. Research men, knowing that certain colors did have a direct effect on people, began delving into the question of whether or not color had actual physical power and energy which could be harnessed for practical purposes such as making a theatre more attractive and appealing to patrons.

One of the first things discovered was that color waves could be measured—i. e., violet was 16 millionths of an inch; yellow, 22; red, 32; and so on. Experiments proved that color had a pronounced effect on muscular reaction. In ordinary light, muscular activity was found to be 23 units, increasing to 24 units for blue, 28 for yellow, 35 for orange, and 42 for red. It was determined that color was a specific and, as such, could be reduced to a given formula to produce a desired result. To determine the efficacy of their findings, the color engineers visited 500 hospitals in seventy cities and evolved basic plans by which color could be employed as a direct therapeutic aid. Basis of the plan was to use the power and energy in color to replace the static dead-white treatment, which tradition

HAYES QUINN, noted color engineer, is explaining some of the basic principles of color dynamics to Eleanor Patterson and Betty Thorpe. While much of the information concerning the inherent power and energy in color was discovered by Sir Isaac Newton, only recently have the principles been adapted to practical use in theatres.

falsely prescribed as the only color maintaining an antiseptic atmosphere. By 1942, a definite science of color application for hospitals, known as color therapy, had been established. This was the immediate predecessor of the color dynamics principles or the scientific application of paint to promote efficiency and comfort in man-made surroundings.

Practical color schemes in war plants increased production by raising morale, decreasing absenteeism, reducing accidents, and stimulating a sense of good housekeeping with its attendant economy of operations. This was done by using eye-rest and focal colors in planned contrast rather than depending upon simple reflectivity or mere brightness to accomplish efficiency. The principles of color dynamics utilize a comparatively wide range of carefully chosen colors which afford maximum amount of reflection with minimum absorption and glare. Colors, used in accordance with their natural psychologic, symbolic, and visual characteristics, can be equally effective in the theatre as they were in industry.

COLOR AND THE THEATRE

Regardless of type, style, or price class, all theatres should be color-styled to achieve one single purpose: To give patrons the feeling of serenity, well-being, and relaxation necessary for the thorough enjoyment of the presentation. There can be no doubt that people entering or sitting in a pleasant atmosphere will more thoroughly enjoy themselves than they will in sombre or inharmonious surroundings. From its very nature, the theatre should be treated with colors that provoke an immediate feeling of enjoyment. Most theatre operators have recognized this fact and have attempted to employ bright, brilliant colors to achieve this end. Unfortunately, the inexperienced use of more powerful colors, such as reds and blues, can very easily defeat the end results desired. Color harmony produces essentially the same reactions as any other harmony—when properly utilized there is produced a particularly desired effect—when improperly used it creates confusion.

THE COLORS

In color-styling a theatre, the basic characteristics of the primary colors should be kept in mind.

Yellow

Yellow, for example, suggests sunlight and warmth and has a cheering and stimulating effect. It can be used extensively in theatres where the absence of natural illumination calls for substitution of a color bordering sunlight in tone.

Blue

Blue, on the other hand, is a cool color. Although its basic effect on people is calming and spacious, it can, when incorrectly used, become a depressant. Many theatre owners and others look upon blue as a color expressing, as it were, a sense of sophistication and the ultra-touch in decoration, and have thus used it more extensively than it should be. There is a lesson in that old saying of "a blue Monday" for theatre decorators, for the phrase has foundation in scientific fact.

Red

The one color found predominantly in theatre decoration that should be used with utmost discrimination is red. Commonly associated with danger, fire, and excitement, a little red can go a long way in any color scheme. Too great use of it can very easily cause irritation.

Green

Green, partaking of the better characteristics of its blue and yellow components, is an ideal color for theatres. This is a particularly appropriate color for the walls of the lobby opposite the doors leading from the auditorium, because of its eye-resting qualities. The theatre patron, emerging from the dark auditorium, goes through a momentary near-blindness, and the green on the wall opposite his eyes will greatly facilitate the readjustment of his vision. In a like manner, the walls of the lobby and foyer should be in tones which will expedite the adjustment of the eyes with least possible muscular reaction. Generally, the color of the lobby should be yellow of about the shade of suntone. This is considerably less brilliant than sunshine and paves the way for the gradual adjustment of the eyes to the ultimate darkness of the auditorium. The foyer should be finished in hues of green further to ease the readjustment. A particularly attractive and adaptable color for foyer wall treatments is the vista green, which proved so effective in easing the eye-strain of industrial workers.

Violet

Violet is another color which is found in the decorative schemes of theatres. Although this has a formality and richness, inherited from its red and blue sources, its practical uses are very limited. Perhaps a touch of violet in stage drapes or hangings should be the extent of theatre usage of this color, commonly associated with royalty and luxury.

Orange

The brightest of all colors is orange. This is made from red and yellow and possesses the attributes of both. Although it is the most cheerful of all colors, it has a great impact force on the eye and is, consequently, tiring. Except for tints and shades, it should be used sparingly in theatre decoration.

COLOR STYLING

Admittedly, the theatre presents a color styling problem not found in practically any other type public building. The exterior of the theatre should be colorful, but the lighter cream colors, attractive and appealing patterns can be achieved. The great percentage of the interior area of the theatre is devoted to the auditorium, which is dark for approximately 100 per cent of the time. However, when the lights do go on between shows or at intermissions, the

BASIS OF THE PRINCIPLES of color dynamics is the scientific use of contrasting colors. A special series of colors, known as Focal Colors, has been developed for use in styling interiors. These colors have been selected from those which afford maximum amount of reflection with a minimum of absodption and glare. Color-dynamic principles employ eye-rest focal colors and planned contrast to achieve maximum visual efficiency with the least effect upon the eye muscle.

color scheme should be such that it does not impact too forcefully upon the eyes of the patrons. This again calls for treatment in green shades to ease the transitional visual period. The traditional blue or blue-green ceilings of theatres are very effective in this respect. Dashes of colors can be introduced in special decorations around the stage or on narrow wall trims.

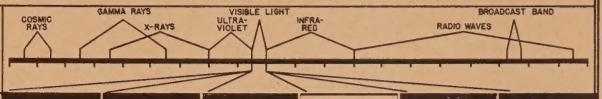
Correct color placement, according to the principles of color dynamics, can be used to change the apparent proportions of a theatre lobby, foyer, mezzanine or other areas. Long narrow lobbies, often found in theatres in larger cities, may be made to seem wider by use of darker colors on the end wall to make them advance and light colors on the long side walls to make them retreat. In square foyers, the impression of monotonous proportions can be dissipated by painting one wall, preferably the one opposite the entrance from the auditorium, in a color value different from the end walls. High ceilings, such as found in the older theatres in smaller communities, can be made to seem lower by painting them darker than the walls. Dividing the wall area by use of a dado will appear to reduce the height of a lobby or foyer. The low ceiling of a mezzanine can be made to appear higher with use of a shade such as cascade blue, which tends to make it recede in the distance. Use of light colors tends to increase the apparent size of an area and darker colors are often useful in making a large area seem more compact and efficient.

COLOR AND ILLUMINATION

All colors are affected by light and certain ones materially assist in illumination by possessing more reflective or diffusing powers than others. Generally, light from incandescent bulbs does not seriously interfere with color selection, although it tends to reduce the strength and intensity of color. It has a slight yellowing effect from the light itself. While fluorescent lighting is comparatively new, its three types—white, daylight, and soft-white—are widely used. The light produced by the daylight units is cool with a fairly blue hue making it best for use with blues, blue-green, and blue-violet. If other colors are used with this daylight unit they will be affected in much the same manner as adding a small amount of blue pigment to the colors. Thus, any colors in the orange range would prove unsuitable as blue is the complement of orange and would give them a muddy appearance. The white and soft-white fluorescent units produce a warm light tending more toward the red, with the soft-white producing the warmest hues. This characteristic makes them most adaptable to rooms where warm colors—such as ivory, cream, beige, rose, or tan—are used. They should not be used with the green shades, as red is the complement of green and the green would become a dark gray.

THE PRINCIPLES OF COLOR DYNAMICS

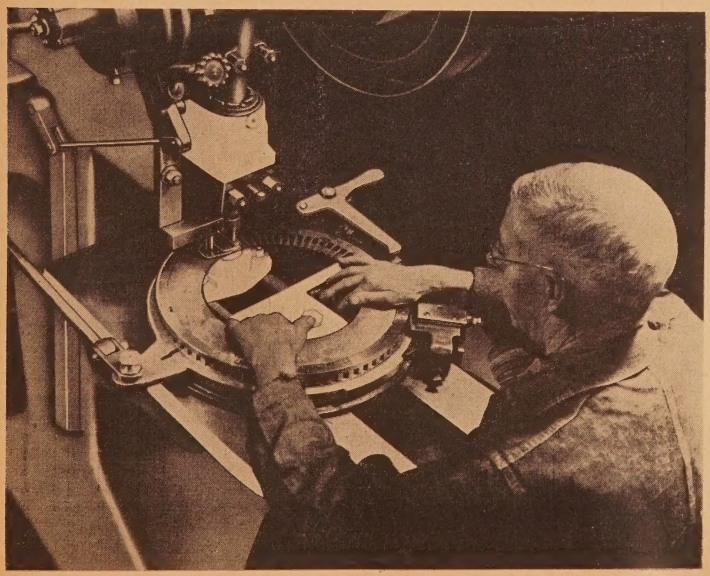
CHARACTERISTICS OF PRIMARY AND SECONDARY COLORS OF THE VISIBLE SPECTRUM USED TO DETERMINE THEIR FUNCTIONAL USES



HUE	VIOLET	BLUE	GREEN	YELLOW	ORANGE	RED
WAVE LENGTH	17 MIL. OF 1 INCH	19 MIL. OF 1 INCH	20 MIL OF 1 INCH	22 MIL. OF 1 INCH	25 MIL. OF 1 INCH	30 MIL. OF 1 INCH
TYPE OF COLOR	COOL	COOL	COOL	WARM	WARM	WARM
MUSCULAR REACTION	——	24 UNITS	28 UNITS	30 UNITS	35 UNITS	42 UNITS
COMPLEMENTARY COLOR	YELLOW	ORANGE	RED	VIOLET	BLUE	GREEN
PRIMARY ASSOCIATIONS	RICH-FORMAL-LUXURY-ROYALTY	COOL-REMOTE-CALM-SOMETIMES DEPRESSING	WARMTH OF YELLOW-COOLNESS OF BLUE-NATURE REFRESHING	SUN WARMTH-STIMULATING	BRILLIANCE-CHEER-VISIBILITY	DANGER-FIRE-SOMETIMES IRRITATING
THERAPEUTIC VALUE	CALMS THE MIND-QUIETS THE BODY	REDUCES MUSCULAR TENSION	CALM PEACEFUL EFFECT	STIMULATING-OVERCOMES DEPRESSION	PARTAKES OF NATURE OF RED & YELLOW	STIMULATING EFFECT

ALTHOUGH NO SPECIFIC DIRECTION can be given for treating a theatre, this chart, showing the physical characteristics of the primary colors, can serve as a guide for choosing proper color combinations to attract desired results. As can be noted in the chart, each color, in addition to its physical characteristics, possesses certain attributes which impel psychological reactions in people. These characteristics and properties have been discovered after extensive reseach and study.

THE EFFECT OF COLOR DYNAMICS is appreciated most on machines where close tolerance work is necessary. On this press, focal ivory has been used to outline the essential parts, while the background is in eye-rest green. This combination is easy on the worker's eyes, and eliminates a large percentage of the nervous strain where close attention must be devoted to the work.



CONCLUSION

Experience in many fields has demonstrated that color can be used as a specific instrument, and that, although color is not a universal cure for all the ills that beset a theatre owner, it will go far in helping make a theatre more attractive. Each theatre, of course, presents its own particular decorating problems, but the foregoing discussion of colors and their basic characteristics can serve as a guide to proper use in decoration. From the very nature of color, there can be a wide latitude of selections of schemes and styles and still use its inherent power and energy. As can be seen in the growing popularity of full-color movies, there is a growing appreciation and knowledge of correct color usage on the part of most people. The progressive theatre operators will take full advantage of this trend by employing scientific color schemes in their houses.

The Development and Uses of Glass Fibers

Theatre Outlets for Fiberglas Products Include Uses as Insulation and Fabrics

The starting point in forming a clear conception of Fiberglas is an understanding of the fact that, although Fiberglas is glass, it is very different from the hard, transparent, and unbendable substance most people think of as glass.

Fiberglas is not hard. It is not transparent. It is not unbendable. It is glass in the form of fine, pliable fibers. The finer Fiberglas textile fibers look and feel like silk. The finest of them are so fine that they are almost invisible.

Fiberglas is not a product that the consumer is likely to go to the store and buy. Fiberglas is an engineering material in the same sense that steel, copper, and aluminum are engineering materials, and like them it is produced in a great variety of types and forms.

Like the consumer who buys a pound of steel, the consumer who buys a pound of Fiberglas buys it after it has been fabricated into a product which is useful to him; or, more frequently, he buys it as a component, and usually invisible, part of a product which, because of the presence of Fiberglas, is able to give him better service.

Before the United States became a belligerent in World War II, Fiberglas was well established as a thermal (heat) insulating material, as an air filtration material, and as an incombustible, dimensionally stable textile material, able to retain its properties when subjected to intense heat, or to contact with moisture, acids or corrosive fumes.

The post-war fields of use for Fiberglas consist in part of peace-time uses, developed before the war; in part of peace-time applications developed to meet special war requirements; and in part of entirely new uses, development of which has been delayed because it was necessary for the Fiberglas research organization to devote all its time and effort to meeting the needs of the Armed Forces.

DEVELOPMENT OF FIBERGLAS

The production of fibrous glass in the early 1930's marked the culmination of many attempts to make a truly pliable glass. During the Renaissance, artisans in glass were attenuating fine glass rods for many decorative purposes including "spun glass" decoration on stemware, but up until a comparatively few years ago the art of glass making had developed more rapidly along other lines.

In 1893, Edward Drummond Libbey exhibited a glass dress, lampshades, and other articles of woven glass at the Columbian Exposition. But the fabric actually was made of bundles of coarse glass fibers woven together with silk threads. Crowds came to see Georgia Cayvan, reigning actress of the day, wear the famous glass gown, but it is suspected that most of the eager spectators came because they thought the dress would be transparent. If they did, they went away disappointed. This was not the only disappointment. The fabric was too stiff to be creased or folded. It was not a true, all-glass fabric. It was no more possible than it had been before, to weave a fabric of glass fibers alone.

However, the result of the Libbey experiment was spectacular, and it attracted a great deal of attention, but it proved to be of no practical value.

In the early 1900's a number of patents were issued in Germany, and some in England, on various processes for drawing finer fibers of glass. The fibers produced were still too coarse for use in weaving practical fabrics, but they were used to some extent as a thermal insulating material, particularly in Germany during the period of the World War I, when the Allied blockade shut out importations of asbestos.

The real start toward commercially useful glass fibers was made in 1931. In that year, research aimed at the development of the necessary processes was initiated in this country by Owens-Illinois Glass Company, manufacturer of glass containers, and by Corning Glass Works, manufacturer of glass specialties, ranging from light bulbs to laboratory glassware and giant telescope mirrors.

From 1931 to 1938 Owens-Illinois and Corning, working separately towards the same goal, spent millions of dollars on the experimental and development work required to create the manufacturing processes and acquire the knowledge needed, not only to produce glass in useful fiber form, but to make practical its production on a commercial scale. Rapid progress was made in improved manufacturing processes and products, and in developing markets.

Late in 1938, Owens-Corning Fiberglas Corporation was formed to continue the manufacture of Fiberglas (glass fiber) materials, to carry on further research, to explore additional new uses, and to adapt the materials to still other uses which their inherent properties made them uniquely qualified to serve. The new company acquired all the assets that Owen-Ilinois and Corning had devoted to the development and manufacture of fibrous glass.

FIBERGLAS, made by the Owens Corning Fiberglas Corporation, can be manufactured into semi-rigid sheets or boards and the material installed for heat and sound installation, as is shown in this photograph. This material, easy to handle and to install, may be faced with a variety of substances, to make "building board" for use where the structure itself carries the load. Fiberglas may be resin-bonded for achieving even greater utility.

PROPERTIES OF FIBERGLAS

The different fabricated forms of Fiberglas have different properties, but the fibers themselves possess certain properties that are basically responsible for the wide range of services that Fiberglas is able to perform in its many and diverse fabricated forms.

Flexibility is the property of glass fibers that distinguishes them from all other forms of glass. Glass fibers are flexible for just one reason. They are almost incredibly thin in relation to their length. Glass fibers possess the greatest tensile-strength-to-weight ratio of any commercial material either occurring in nature or synthesized by man. A cubic foot of uncompressed glass fibers of the wool-like type used for thermal insulation weighs only one and a half pounds, and is approximately 100 times lighter than a cubic foot of bulk glass.

Glass fibers possess remarkable dimensional and physical stability. Although they may be as fine as gossamer, the fibers are neither more nor less than microscopically thin glass rods. Because they have no cellular inter-structure, they cannot absorb moisture. Their surfaces can be wet, but moisture cannot get into the fibers to cause them to shrink, stretch, swell or rot.

Finally, the fibers are completely incombustible. Light a match to a strand or clump of the glass fibers, and they will not flame up or even smolder. They may melt, and the match flame will leave a black deposit of carbon—but neither a match nor anything else will make the fibers burn, nor will they give off smoke or any noxious fumes.

HEAT AND SOUND INSULATION

In meeting the requirements for thermal insulating materials which will stand up under the strains, stresses, vibration, and humidity conditions to which combat ships and bomber and fighter planes are subjected, the Fiberglas corporation and applicators of its materials developed many improvements in products and installation methods.

These are reflected in the post-war uses of Fiberglas in such standard pre-war applications as the thermal insulation of water heaters, freight and passenger planes, railroad cars, trucks, buses and merchant ships, factories and other types of industrial and commercial buildings and their equipment.

In a number of war applications, Fiberglas thermal insulation was employed for the control of sound as well as heat. It was installed for this twin purpose in war-production plants. Blankets, composed of down-like glass fibers, were used for both heat and sound insulation in multi-motored bombers. These and other war uses of Fiberglas as an acoustical material have laid the basis for its wide use to control sound, by many industries, including the motion-picture, radio, and television industries.

Properties of Insulation Material

The resilient mass of intricately interlaced glass fibers which is the basis of all forms of Fiberglas thermal and acoustical insulation is composed of fibers whose diameters depend on the purpose for which the insulation is to be employed.

The wool-like mass can be installed in the form of bats, rolls, bulk fibers or shredded fibers. The blankets into which the mass can be formed can be faced with paper, fabric, or metal mesh. The sheets and boards into which the mass can be fabricated can be given a variety of surface treatments, including a sanded, smooth finish on one side, a paper or fabric facing on one side, and an overall asphalt coating. They can be given a hard surface by facing them on one or both sides with sheets of plywood or a plastic material.

The low thermal conductivity is due primarily to the millions of air spaces entrapped by the interlaced fibers. These air spaces are poor conductors of heat. In addition, where the fibers cross and touch each other they have exceedingly small contact points. Heat, therefore, cannot pass readily from one fiber to another.

The same air spaces, and the tremendous surface area presented by the mass of fibers, absorb and break up sound waves. When Fiberglas bats, rolls, blankets, sheets, or boards are installed immediately behind a perforated surface of metal, asbestos board, fiber board or similar material, the noise reduction factor is high, the exact figure depending upon the form, thickness, and density of the Fiberglas, the type of finish and the method of installation.

Fiberglas thermal and sound insulating materials are inherently fire-safe. Organic facing materials can be flameproofed. The small amount of lubricant with which the fibers are treated, or the small amount of thermosetting resin used to give permanence of form, may volatilize at elevated temperatures, but the fibers themselves retain their complete incombustibility, and present a barrier to the spread of flame.

The immunity to rot and decay possessed by the glass fibers is carried over to Fiberglas insulating materials. In addition, the materials provide no sustenance for insects or vermin of any kind. Properly installed, they do not settle down under shock or vibration, leaving gaps for heat or sound to pass through; rather, unless bonded with a resin, the compressed fibers tend to fluff out, filling any voids.

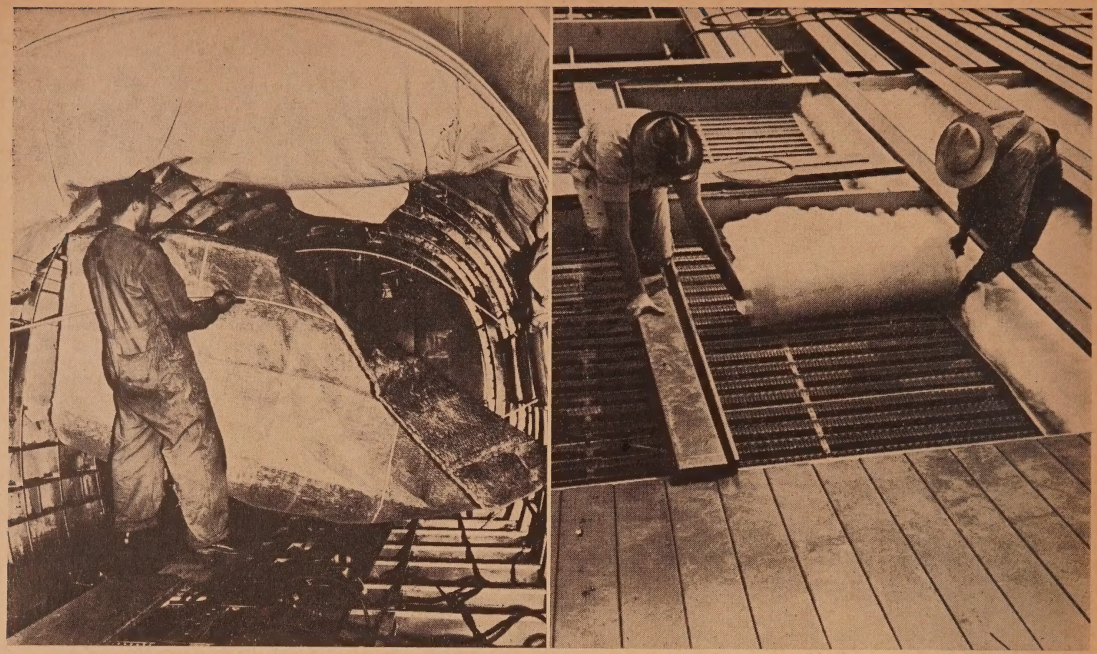
The amount of moisture picked up by the massed fibers from humid air is infinitesimal—but a fraction of 1 per cent by weight. The rapidity with which the wool-like forms of Fiberglas insulation will dry out after wetting, if drained and vented to the air, is due to the fact that water can wet only the surfaces of the fibers.

Fiberglas thermal and sound insulation is one of the group of mineral wool insulations, including rock wool and slag wool, with which applicators and users have been familiar for a half century. Its application involves no departure from familiar practices. It is light in weight, easy to handle, easy to cut or fit to required shapes or sizes, and holds together well while being applied.

Applications

The bat, roll, bulk, and shredded forms of Fiberglas are suitable for use in all temperatures from sub-zero to approximately 1,000 degrees Fahrenheit. Bats and rolls are widely used in water heat-

ACOUSTICAL BOARD of Fiberglas serves as decoration as well as insulation against heat and sound, as pointed out in this photograph from the Owens-Corning Fiberglas Corporation of the radio operations room in a police headquarters. Because it is impervious to moisture, Fiberglas does not rot nor decay, and it is not attacked by rodents or other vermin. When properly installed, the material does not settle under shock or vibration.



IN BLANKETS OR IN BATS, Fiberglas can also be used as insulating material. At the left is seen a worker installing a Fiberglas thermal-and-acoustical blanket in the cabin of a Pennsylvania Central Airlines Capitaliner plane. At the right, two men install Fiberglas in bat form in the roof of a building. This product of the Owens-Corning Fiberglas Corporation, being real glass, is absolutely fireproof. Where the blankets or panels are faced with flammable materials, the surfacing material can, of course, be fire-proofed by approved means. Fiberglas materials of these types are easily cut or fitted to the required shapes and sizes.

ers, industrial ovens, insulation of homes and other buildings, railroad cars, ships, buses, and trucks. The bulk fibers are generally employed as an accessory material, for stuffing or packing into odd spaces. Shredded Fiberglas insulation is used whenever pneumatic application is called for.

Fiberglas blankets faced with flame-proofed muslin or kraft paper are used extensively to insulate buildings, refrigerated freight cars, railway passenger cars, trucks, trailers, and buses. Blankets with a facing of incombustible Fiberglas cloth are used to insulate aircraft and aircraft equipment.

With a metal-mesh facing, the blankets are employed for the insulation of heated equipment such as boilers, tanks, industrial ovens, large ducts and breechings. Temperature limits of Fiberglas blankets vary with the facing material used. Temperature limits of the Fiberglas itself are the same as for bats and rolls.

Fiberglas semi-rigid or rigid sheets or boards are used for building insulation. They are also employed in all types of low- and medium-temperature equipment. In equipment operating at temperatures above 450 degrees, Fahrenheit, the resin used as a binder disappears from the hot side, leaving a layer of unbonded fibers which fulfills its insulation function with unimpaired efficency up to 1,000 degrees Fahrenheit, so long as it is enclosed by supporting surfaces.

Sheathed on all sides with a tough, durable asphalt coating, Fiberglas board is widely used in cold storage service, and performs efficiently under conditions of moisture and temperature variations such as exist in refrigerated spaces. An asphalt-enclosed board with a density of 9 pounds to the cubic foot can be used for the insulation of floors and the construction of self-supporting—but not load-bearing—partitions. A 6-pound density, asphalt-enclosed board is made for use only on ceilings, and on walls where the structure carries the whole load.

Fiberglas boards accurately molded into cylindrical form provide a convenient and efficient material for insulating steam and other pipes in all standard sizes. A blanket-type insulation with a metal-mesh facing is also employed for insulating pipes.

A high-temperature block is available for insulating boilers, breechings, heated tanks, casings, ducts and other heated process equipment. There is also a Fiberglas insulating cement which can be used over Fiberglas insulation blocks and blankets to provide a monolithic insulation for pipes, tanks, ovens and other types of heated equipment.

FIBERGLAS FABRICS

Incombustibility and dimensional stability are rare properties in textiles. It is the possession of these properties that is largely responsible for the numerous current uses of Fiberglas textiles, and for the interest the textile industry is showing in exploring possible additional uses, both of the glass fibers alone and in combination with other fibers.

Electrical Applications

Fiberglas tapes, braids, cloths and sleevings, impregnated with a suitable varnish were being widely employed as electrical insulation in motors, generators, transformers and other electrical units before the war. The same characteristics that caused Fiberglas electrical insulation to be so widely used in war applications—a small space factor and resistance to high temperatures and moisture penetration—are proving a major aid to design engineers in their continuing efforts to give electrical equipment greater stamina and to reduce the size and weight of units required to do a given job. For special uses, Fiberglas-insulated motors have been made that weigh only a pound per horsepower. As during the war period, Fiberglas tapes and cloths are employed to wrap insulated piping on ships and exhaust pipes on planes. Use of Fiberglas fabrics as reinforcement for plastics is rapidly expanding.

Fiberglas-Reinforced Plastics

In fabricating Fiberglas-reinforced plastics, layers of Fiberglas cloth are impregnated with a low-pressure, thermo-setting resin and are placed, one on top of another, until a laminate of the desired thickness is built up over or in a mold; or the laminate may be built up and then draped over, or shaped in, a mold. The mold, and the laminate

formed to the desired shape, are placed in an oven where the laminate is cured.

Aircraft parts have provided the most spectacular applications of Fiberglas-plastic combinations, but they are also widely used for the fabrication of tools, dies and jigs, and for panel boards on which electrical control instruments are mounted. Designers and engineers are experimenting with the material for such products as passenger car and truck body parts, furniture, toilet assemblies, and additional articles where attainment of light weight combined with high strength and ease of fabrication is the goal.

Coated Fiberglas Fabrics

The Fiberglas fabrics coated with synthetic rubbers and resins which were developed for war uses have high tear strength, withstand repeated flexing, are resistant to destruction by fungi, and have high dimensional stability. Other properties vary with the coating employed, but coated Fiberglas fabrics are being produced which are flame-proof and have high resistance to moisture penetration and to the effects of contact with gasoline, oil, chemicals, and greases.

Present uses include battery covers, oil pressure switch diaphragms, tape for expansion joints of hot air ducts, protective clothing for workers, and protective carrying cases for precision instruments.

Performance of the material in this last application has created a potential demand for it in applications where leather or organic fabric construction has been used, such as durable, lightweight luggage. Use of coated Fiberglas fabrics is also being considered for such applications as tarpaulins, wading pools for children, and tents and shelters of all kinds exposed to weathering and consequent attack by fungi.

Fiberglas Decorative Fabrics

Ever since Fiberglas fabrics were first produced, it has been recognized that they possess properties which make them of great potential value as decorative materials. The fact that they will not burn, for instance, makes them particularly suitable for use in places of public assembly—theatres, night clubs, hotels and schools—where the presence of flammable fabrics constitutes a serious fire hazard.

It is true that flammable fabrics can be flame-proofed, but the flame-proofing is impermanent. If the fabrics are to remain fire-safe, they must be re-treated at regular intervals. This can involve a very considerable, recurring expenditure. It has been stated that the cost of flame-proofing fabrics in the New York City public schools is more than $300,000 a year.

The fact that Fiberglas fabrics will not shrink or stretch, that moths cannot eat them, and that they resist the attack of mildew or other fungi, makes them potentially suitable for wider use.

Until recently the chief obstacle to the wide use of Fiberglas decorative fabrics has been the lack of any satisfactory method of dyeing them or printing designs upon them.

This obstacle has now been overcome. Methods of dyeing and printing the fabrics with resin-bonded pigment dyes have been developed, and, as a result, Fiberglas decorative fabrics are now available in a rather wide range of solid colors and printed designs. The fabrics have excellent fastness to light. They can be dry cleaned provided due care is taken in handling them. Superficial dirt can be wiped off with a damp cloth.

At the present time, Fiberglas decorative fabrics are being sold principally for use as draperies or in other applications where they are not subjected to repeated rubbing. In such applications the slight crocking of the dye, or the abrasion of the glass fibers, that may occur if the fabrics are repeatedly rubbed, is not a serious consideration.

The extent to which Fiberglas decorative fabrics will be used for other than these applications is still somewhat uncertain. Serious consideration is being given to their use for shower curtains. Although uncoated Fiberglas fabrics are not now suited for upholstery applications, flame-proof, resin-coated Fiberglas fabrics, now available in a number of colors, may prove adaptable for use as furniture covering. The incombustibility of the fabric would be an asset for indoor furniture.

Combinations of glass fibers with other fibers—rayon, linen, cotton or silk

IN DECORATIVE FABRICS, Fiberglas will find one of its most important markets. In recent years, the Owens-Corning Fiberglas Corporation has been furnishing more and more of this material to places of public gathering. At the left, such fabrics add glamour and fire-resistance to the Iceland Restaurant on New York's Broadway. Wallcoverings are of green Fiberglas, with the draperies in white and plum. Such ideas might find utility around theatres snack bars. Hotels, too, use Fiberglas, as is shown at the right, taken in the cocktail lounge of a New York hostelry. This type of drapery material has many theatre applications.

—also offer unusual possibilities in decorative fabrics. Here the glass fibers would be employed both for design effects and to give added dimensional stability to the fabrics. Research in such combinations is still in its initial stages.

FIBERGLAS AIR FILTERS

The first commercial use of Fiberglas fibers was for air filtration. During the pre-war years, pads of relatively coarse fibers, treated with an adhesive, were employed to strain dust and pollen from the air circulated by forced-warm-air heating systems, and air conditioning systems. Today, Fiberglas air filters are standard requirements for many of these systems in factories, stores, theatres and other buildings.

FIBERGLAS MAT

The thin, felted Fiberglas mats which, by holding the power-producing material in place, gave longer life to storage batteries in military automotive equipment during the war, were used for the same purpose in passenger cars, buses and trucks before the war, and are again being widely used in storage batteries for peace-time automotive equipment.

In addition, new uses for the mat have been developed. In roll form, it is being employed as a material for wrapping underground oil, gas and other pipe lines to protect them against corrosion and electrolytic action. The material can be wrapped around bitumen or coal-tar-coated pipe, thus forming a continuous water-tight bond.

Primarily because of the high tensile strength and non-moisture-absorption characteristics of the individual glass fibers, the Fiberglas mats are being employed as the base for a new plastic laminated material for plastic coil forms, condenser spacers, stand-off insulators, etc., in radio, radar, television and other high-frequency electronic devices.

Fiberglas mat is also being employed as a base material for gaskets and sheet packing.

FIBERGLAS RESEARCH

Fiberglas was born of industrial research. From the time of its birth, research has been depended upon to make it possible to produce finer and stronger fibers, to develop new uses for Fiberglas materials, to adapt the materials to meet needs that cannot be adequately met by other materials, and, finally, to produce progressively better materials that can be sold at progressively lower prices.

For a great many years people have known how to make good glass—but not glass of a kind that can be produced in the form of strong, durable and almost infinitely fine fibers. To mention only one factor, expansion of surface area presented a problem that only skilled and patient research could solve.

Because glass does not rust, and is able to withstand surface attacks of many acids and mild alkalies without any apparent harm, most people assume that, aside from breakage, glass is practically indestructible. But the glass chemist knows that some glasses are more durable than others, and that surface attacks do have an effect on most commercial grades of glass. The greater the surface area, the greater is the opportunity for these attacks to occur.

When a given mass of glass is drawn into fine fibers its surface area is increased many times. For this and other reasons it is necessary to develop special glass formulas as one step towards providing the fine glass fibers with resistance to weathering, chemical action, and other influences to which they will be exposed. No single formula will solve the problem, since the properties the fibers must possess differ with the uses in which they will be employed.

Fiberglas research is not confined to the company's own laboratories. Many problems involved in the development and testing of materials are regularly referred to independent testing and university laboratories in order to bring fresh viewpoints to bear. The laboratories of other manufacturers, too, have done a superb job in adapting Fiberglas materials to their particular needs, thus constantly broadening their fields of use.

New uses of Fiberglas have been found every year since glass in fiber form was first produced in this country on a commercial scale. Today Fiberglas is produced in more than 4,000 forms to meet the requirements of hundreds of different applications. There remains, however, plenty of new territory to be explored.

The war shelved more than 300 research projects covering potential peace-time uses. These could not be completed because of the demands made by the war upon the Fiberglas research organization. This dammed-up flood of research has now been released. The entire resources of the Fiberglas research laboratories and pilot plants—the personnel of which constitutes approximately 10 per cent of all Fiberglas personnel—is now focused upon the development of new processes, products, and markets.

BESIDES FOR AIR FILTERS, with which theatre men are familiar, Fiberglas is also used for tower packing. Here is seen the material being packed into an alcohol distillation column. By using this product of the Owens-Corning Fiberglas Corporation, towers have been built which will convert high wines into 191.5 proof alcohol in approximately half the time formerly required. A similar use of Fiberglas is found in the oil industry.

SECTION 1 - B

CONSTRUCTION

1945

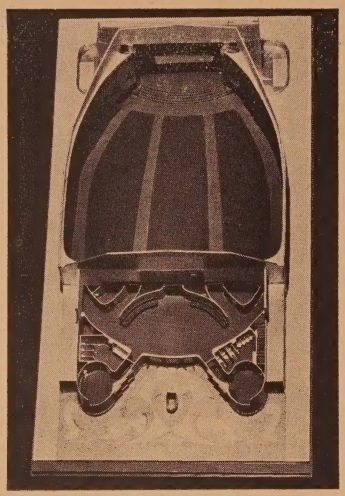
The All-Steel Pre-Fabricated Theatre

Methods of Mass Production Are Applied To Create New Type of Theatre Structure

New developments in motion-picture-theatre construction are promised with the advent of pre-fabricated theatres developed by the National Theatres Amusement Company, headed by Charles P. Skouras. Upon instructions from Skouras and under the direction of R. H. McCullough, the organization's architectural and engineering departments made a study of the theatre construction with a view to speed of erection and a higher degree of safety.

The idea of designing a building which can be duplicated many times, such as pre-fabricated theatre, is not new. Small factories, commercial buildings, and stores have been built again and again from one set of architectural plans. The aim has always been to produce in quantity.

The knowledge, gained through many years of experience and study, has been concentrated to this end, which has resulted in this new development. The pre-fabricated theatre, with light steel construction, is said to be theatre of tomorrow.

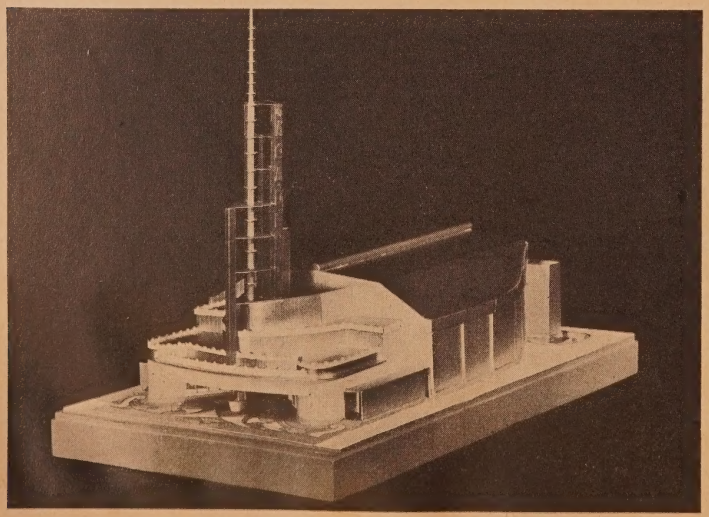


THE 1,000-SEAT PRE-FABRICATED THEATRE. This bird's-eye view of the floor layout, with the roof removed, shows the details of the various public and private rooms of the middle-sized all-steel theatre.

PRE-FABRICATED THEATRES

Pre-fabricated theatres are of all steel construction from the foundation and floor, and are demountable, with many achievements in theatre building practices. The materials selected for this all-steel, pre-fabricated construction give the assurance of beauty of design, as well as strength.

THE 1,000-SEAT PRE-FABRICATED THEATRE. Seemingly patterned more after its 800-seat sister than in anticipation of the 1,200-seat theatres, this model of the Academy Theatre is designed to show what can be done for the middle-size communities now without any theatre or with only inadequate service. With the sweeping curves of the inside partitions and, on the outside, the fluted walls, the striking tower, and the decorated sidwalk, this theatre is indeed kin to the others. All text and pictorial material is from the Skouras organization.



The theatres are designed to be water-proof, fire-proof, earthquake-proof, and vermin-proof, as well as being for all purposes impervious to climatic and weather conditions.

These theatres will have seating capacities from 600 to 3,000. The length and width of these pre-fabricated buildings will depend upon the seating capacity of the model selected.

These theatres come in two types, the stadium and the one-floor type. The stadium-type theatre permits no waste of space and utilizes a smaller ground area than other types of theatres, but, nevertheless, has a seating capacity equal to a theatre of conventional construction occupying more ground area.

This building, purchased as a "package," can be shipped to any destination by rail or truck, or by boat if convenient. After the reinforced concrete foundations have been laid and upon arrival of the steel and other assembly parts, this building can be erected in about three weeks' time, as all-steel sections are pre-fabricated at the mill, cut and ready for installation.

EXTERIOR STRUCTURAL DETAILS

This building is erected upon such concrete foundations as are made in accordance with the requirements for the particular area or locality. Since this type of building weighs less than the conventional masonry structure, a lighter foundation may be used.

The structural frame is of structural steel and is self-supporting. All exposed structural steel is fire-proofed with pre-cast gypsum.

All exterior wall structures are of fluted-metal design. The side-wall construction includes units of poured, reinforced gypsum between sheets of metal, with different thicknesses to comply with fire regulations in different territories. This unit is constructed in varying lengths, with interlocking sections, and is held in place with bolts and nuts, securely fastened to the foundations and also to the structural members.

The roof is constructed of Galbestos and is pre-fabricated and cut at the mill and shipped to the job, where it can be quickly installed.

All of the theatre structures which have thus far been designed include decorative towers for the name of the theatre and also for neon animation. The extreme height of these towers is for the purpose of erecting a television antenna in the future.

INTERIOR STRUCTURAL DETAILS

All interior partitions throughout the theatre have a two-hour fire rating. They are made from poured gypsum be-

tween one metal and another outside covering of decorative metal, either of stainless steel, aluminum, or other metallic treatment.

The metal surfaces of the interior, as well as the exterior, are baked enamel, which eliminates corrosion.

All partitions are bolted to the floor and special metal bases used. Where the partition connects to the ceiling, a special molding is provided for added appearance. The interior metal partitions are of a curved design, to provide ease of public passage.

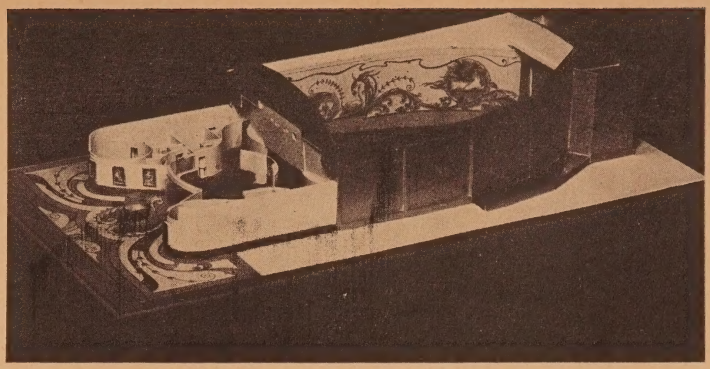
There will be no plaster in any part of this theatre.

All partitions and ceilings are soundproof.

All ceiling areas below 25 feet include a two-hour fire rating.

Terrazzo and tile floors can be applied where desired.

All wiring and plumbing will be prefabricated, as much as possible, in the structure at the mill.



THE 800-SEAT PRE-FABRICATED THEATRE. With the upper portions of the model theatre removed, a good view of the left wall may be obtained, revealing the type of decorations which may be available for this size theatre. The decorations are snapped in place, and can be changed, if desired, according to the season or the whim of the operator. This and all other pictures of the all-steel pre-fabricated theatres are used through the courtesy of the National Theatres Amusement Company, Inc.

EQUIPMENT DETAILS

Marquee and Signs

The marquee lighting will consist of a continuous row, underneath the interchangeable letter casing, of recessed spots. The main marquee ceiling will also be lighted by recessed spots and decorative, recessed neon, and there will also be fluorescent lighting both top and bottom, and sides.

Neon and other special lighting effects will be applied to the towers.

The marquee is part of the main structure and will accommodate four rows of 10-inch, interchangeable letters. It has a 57-inch visible opening for interchangeable letters and this visible opening can be increased to any height desired. Animated neon borders will be installed around the interchangeable letter casing so as to attract attention.

Display Frames

The display frames are of special design and will accept standard size posters of 40 x 60 inches.

Lobby Doors

The lobby doors will be of Tuf-flex glass and instead of including panic bolts will be operated by a special foot tread.

Removable storm doors have been provided across the lobby, so that, during the summer months, when they are not needed, they can be easily removed.

Box Office

The box office for this new type of theatre will have the following facilities:

Space for a five-unit ticket machine.

Space for a box office safe.

A suitable sized cash drawer.

Deal plate and side shelving.

Suitable space for a coin changer, coin changer to be right-hand operated.

Built-in electric heater.

Exhaust fan on top of box office.

Vent grille at bottom of box-office door.

Glass in box-office door will be removable, with a good frame, and permanent grille to be installed so that when the box office door glass is removed ample protection will be provided.

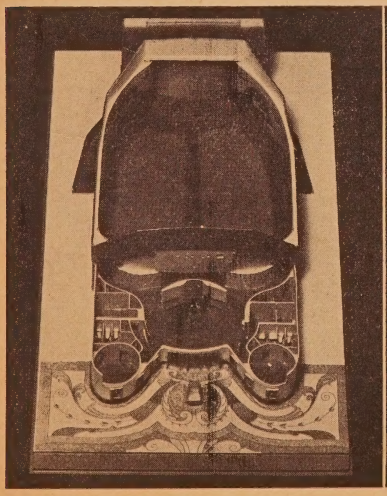
Built-in seat which can be folded against the side of the box office.

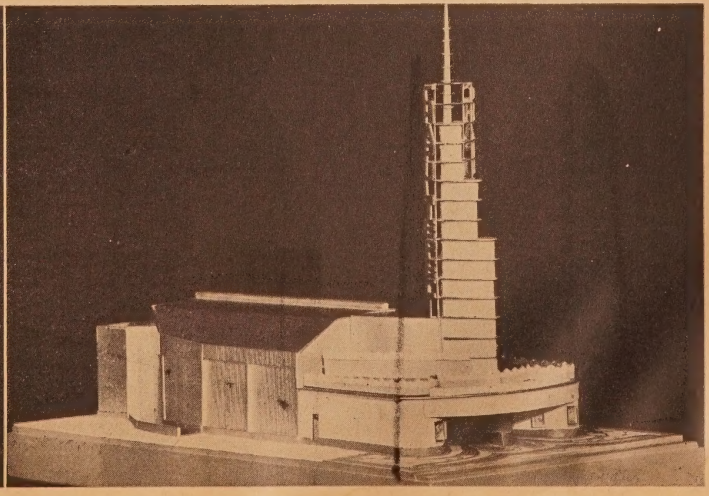
Outside phone and house phone to be placed so the cashier can easily answer phones.

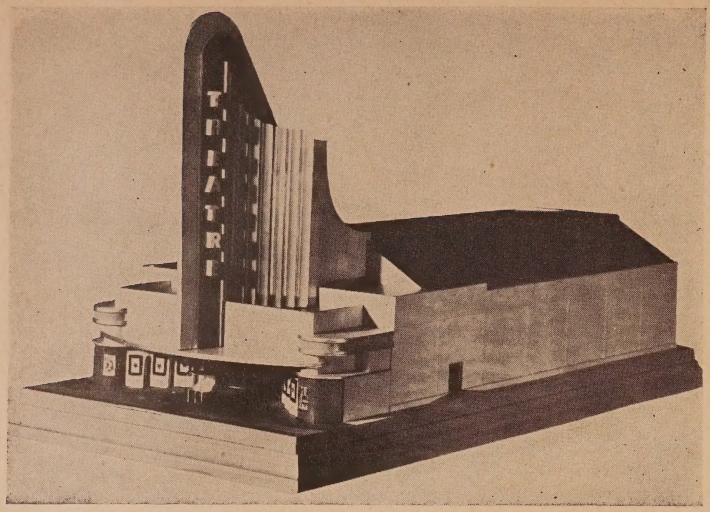
Ceiling lighting to be recessed so lamps will not be exposed, using all fluorescent lighting.

Two rear-view mirrors will be installed inside of box office so cashier can see at

THE 800-SEAT PRE-FABRICATED THEATRE. This model of the Chapultepec Theatre represents the basic idea for a theatre to seat 800. Dominated by a tower, which is designed ultimately to house television-receiving equipment, this is thought to be one of several sizes of theatres to be built, on a production line enmasse, by the Henry J. Kaiser Company. The cut-away section at the left gives an idea of the location of the rest rooms and other details of the floor plan. The over-size port of the projection room can be used for spot and flood lights or for television projection equipment when such shall be perfected for theatre use.







THE 1,200-SEAT (ONE-FLOOR) PRE-FABRICATED THEATRE. A general view of the second most pretentious theatre of the all-steel group of pre-fabricated theatres described in the accompanying article. Note in all the models how the artist has developed a special sidewalk decoration for the theatre, with the box office the center of the design. Eight outside display boards are provided the theatre, six presumably for ordinary material and two for special back-lighted displays. The tower again offers ample room for any name which may be desired, and it is, as with the others, designed ultimately to house the teievision-receiving antenna.

the rear of each side of box office.

An illuminated price sign will be installed so the prices can be interchanged from the inside of the box office.

A schedule card is also provided.

A permanent electric clock to be installed so the patrons will have full view of this clock at all times.

Sandblasted designs will be applied at the top and bottom of the box office glass.

Recessed hinges will be used on the box office door.

The entire box office will be constructed of non-combustible material.

A speech hole is provided with a unit so no draft will get to the cashier.

A portable cover for the opening of the box office, above the ticket machine and coin changer, will be provided.

No curved glass is used in any part of this box office.

A foot switch will be installed so the cashier can signal the doorman at any time.

Projection Room

The projection room includes space for projection, spot-lamp, and effect-machine equipment. It will also accommodate future television equipment.

It is hoped in the very near future that projectors will be of the composite type, with the sound-equipment amplifiers built in the projector base.

Auditorium

All surfaces of the auditorium are acoustically treated with the exception of the wainscott, which is metal. The acoustical treatment acts as an insulator and is of Fiberglas, with a metal grille holding this material in place.

All draperies throughout this theatre will be of fire-proof material.

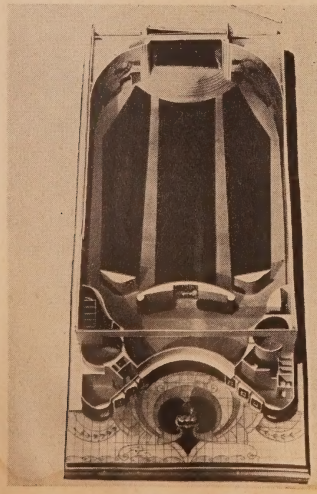
All interior decorations for the auditorium ceiling, side walls and other spaces in the theatre are applied at a studio, on a material similar to hard pressed masonite, in varying designs. They are applied over the Fiberglas acoustical treatment in relief, with a snap-on attachment, so that the theatre can be decorated in a short time. When it is desired to change the decorations, they can be ordered to the owner's selection. Seasonal decorations can be obtained.

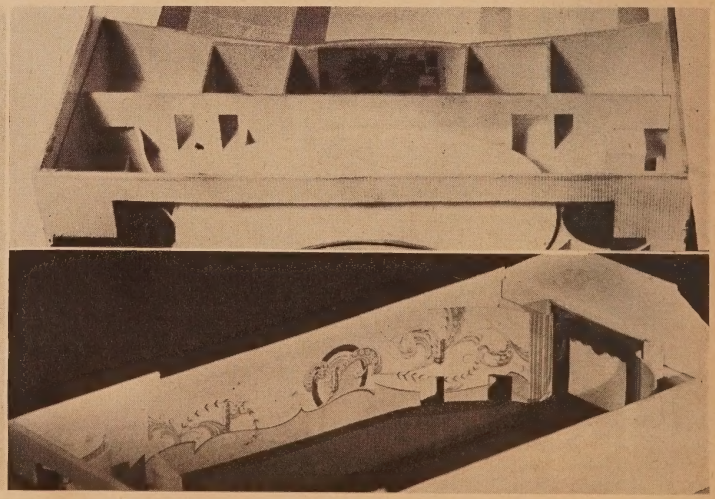
All lighting fixtures throughout the building are recessed with unbreakable plastic to eliminate any possibility of hazard. There will be no suspended lighting fixtures in any part of this new type theatre.

Neon for interior lighting will be used to a great extent, with special dimming equipment.

All aisle spaces are barricaded from exterior light by specially designed partitions. These light barriers prevent light from entering the auditorium, which is a great annoyance to patrons in some of the earlier-type theatres.

THE 1,200-SEAT (ONE-FLOOR) PRE-FABRICATED THEATRE. Here in cut-away (left) is seen the lay-out of the Skouras-Kaiser one-floor deluxer. Note here, as in the other models, that the stage is of the classic amphitheatre type, without footlights. The section of the second-floor level (upper right) shows the position of the projection room, with space for other equipment and services at either side. A glimpse of auditorium wall-decoration detail is shown (lower right). This will probably be one of many types of decorations which may be purchased as desired and installed at will. Chairs of special design will be installed in the auditorium.





Seats

Seats for this new type theatre will be of special design. Seats will be spaced 36 inches back to back, with a minimum width of each seat of 20 inches. The seats will be of fire-proof construction. Materials will be used which will tend to eliminate rodents and pests.

Carpets

The carpet will be cut and sewed to size at the mill, and shipped to the theatre, eliminating the ordinary sewing and cutting of carpet in some local workshop. The carpet will not be tacked to the floor, but will be fastened by a special cleat arrangement.

Miscellaneous Rooms

The lounge rooms, toilet space, and utility rooms, including dressing rooms, have been laid out according to standards from past theatre-operating experience.

A storage room has been provided for candy and popcorn for each theatre, with a special air-conditioning unit.

Heating and Ventilation

This equipment for heating, ventilating and conditioning, instead of being in a centralized plant, will be divided into composite units, so they can be readily installed and removed at will. With composite units, when it is not necessary to operate all units, the desired units can be operated individually.

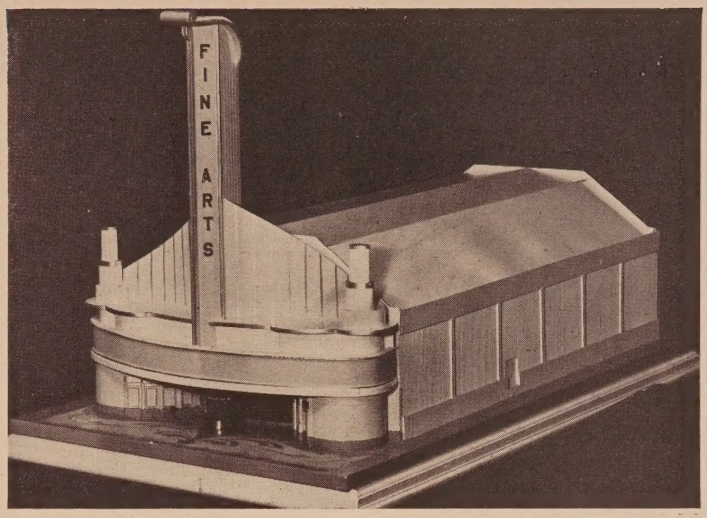
Fresh air ventilation is provided by equipment to meet temperature conditions. In all respects, the ventilation has been planned to afford even distribution of air without extraneous drafts.

Special heating and ventilating systems have been planned for the foyer, lounge, toilet rooms, utility rooms, and projection rooms.

The equipment for the heating system is portable.

Air conditioning equipment will be installed where necessary.

Centralized vacuum systems will be installed with intake ducts in appropriate locations.



THE 1,200-SEAT (STADIUM-TYPE) PRE-FABRICATED THEATRE. Most pretentious of the Skouras-Kaiser theatres, in model no less than in the basic ideas, is this theatre here yclept Fine Arts, conceived along neo-classic lines. It is to be about 162 feet long by 81 feet wide. The multiple-purpose tower, the ample space for display, and the specially designed sidewalk combine to make this the finest of the four theatres here presented.

IN CLOSING

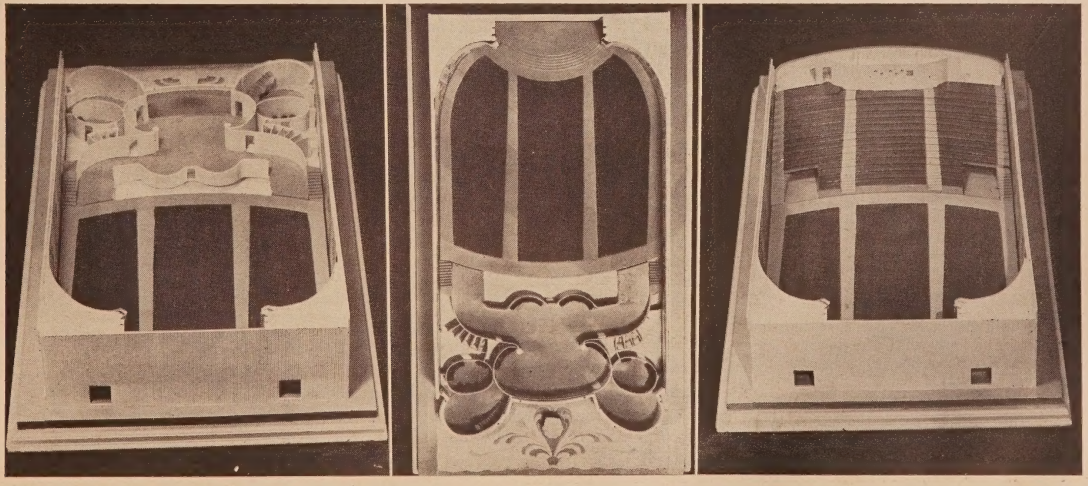
From a standpoint of public convenience and safety this new type of theatre building has been planned to afford the maximum of convenience in seating arrangement, aisle space, unobstructed vision and comfort, as well as adequate exit facilities.

At this time it is impossible to enumerate all the features and facilities which will be part of this theatre building.

New materials, new ideas, and new innovations in architecture and engineering will be utilized to the fullest extent, so the day this new type of theatre opens it will be up-to-the-minute in every respect.

The majority of the features in this new type of building are patented and copyrights cover the plans and designs.

THE 1,200-SEAT (STADIUM-TYPE) PRE-FABRICATED THEATRE. The floor plan is clearly set forth (left and center) when the stadium portion of the theatre is removed. In some details less complicated than the smaller theatres, this one should be operated more efficiently. The broad entrance ramps to the auditorium, and the adequacy of the rear emergency exits, should make for easy handling of the crowds under any circumstances. The stadium section (right), with its aisles a direct continuation of those in the auditorium proper, make for easy handling of patrons. Ample space is provided for the projection apparatus.



States and Cities Consider Pre-Fabrication

Survey Indicates Mass-Produced Theatres Must Stand on Own Merits to Gain Approval

That theory and practice do not necessarily go hand in hand is a fact which needs no confirmation. Accordingly in any consideration of pre-fabrication, whether of theatres or any other type of structure, it should be mandatory upon the commentator somewhere in his discussion to consider the practical aspects of the problem and to consider whether or not the anticipated development, however nice and law-abiding it may seem on paper, could be brought into reality.

Any type of construction must, as everyone knows, pass some sort of official examination and before actual work can be started, approval for the project must be obtained. In the normal course of events, the difficulty of obtaining approval seems to be proportional to the degree which the general public can be expected to use the projected structure. And thus it is that theatres, halls, and other gathering places of the public must pass the most stringent of requirements.

Pre-fabrication, by virtue of past performances and connotations of the name in reference to structures of sufficient size as to serve for groups of people, has not been as "permanent" as structures erected, on site, from the ground up. However, this may be just one of the many vagaries of the public mind, for, actually, when properly constructed, a pre-fabricated building is as architecturally sound and structurally safe as any other.

A second connotation in the public mind is that of easy destruction, by fire or through any other means. It is quite probable that this impression is of pre-war origin—back in the days when pre-fabrication meant plywood, and plywood meant virtual tinder. But today, although pre-fabrication may involve the use of plywood, that plywood can be made of practically the same degree of fire resistance one thinks of in connection with the metals.

But these presently erroneous conceptions continue.

When laws are drawn—and when municipal regulations are passed—an effort is made to have them inclusive and permanent, even though architectural and engineering progress, while inclusive, is never static. And so it is that times change and ideas of construction change, but the laws and regulations continue.

It is, then, important to take a glance at the building codes of the states and cities to find out what the present situation is in reference to prefabricated theatres.

When, in July, 1945, the story broke about the prospective establishment by the National Theatres Amusement Company, Inc., of a subsidiary to make and distribute all-steel, pre-fabricated theatres, the Editors of the BETTER MANAGEMENT Department of THE EXHIBITOR and of THE THEATRE CATALOG undertook to find out what the states and cities thought of the idea as it then existed and to determine whether such theatres could, under existing regulations, be built.

Accordingly, copies of the August 1, 1945, issue of BETTER MANAGEMENT were sent to each of the 48 states and the District of Columbia, and to the largest city in each state. The largest city was selected because it was considered that there might be found the most strict regulations covering theatre construction, and if these cities would permit construction of pre-fabricated theatres, then probably the smaller communities would also approve.

The following paragraphs present a cross-section of the nation's opinion on the question of building of pre-fabricated theatres. Whatever the reader's conclusion may be, it must not be forgotten that, no matter how excellent may be this basic idea, the final realization of this, or any theatre project, rests upon the ability of the plans and specifications of the project to meet the requirements of a specific building code.

ALABAMA

City of Birmingham

In the city of Birmingham, the all-steel, pre-fabricated theatre would not, according to H. E. Hagood, chief building inspector, meet the requirements in Number One fire zone, or Group A theatre. However, it was his opinion that this type of construction would be approved by the Board of Appeals for Group B and C theatres "I see no objection," Hagood stated, "to this type of structure, but I do question the interior decoration."

CALIFORNIA

City and County of San Francisco

Although it does not appear that the proposed type of construction is prohibited by the San Francisco Building Code, F. H. Spitzer, chief structural engineer, declared that no definite answer could be given until an application for a building permit had been filed with the Department of Public Works, Bureau of Building Inspection, and after proper examination of the plans and specifications.

COLORADO

Colorado has no state building code covering construction of the all-steel, pre-fabricated type, all ordinances being handled by local municipalities.

City and County of Denver

The ordinance of the city and county of Denver would prohibit, according to Lyle D. Webber, chief building inspector, any type of construction except fire-resistant construction for theatres with a seating capacity of over 1,000. Theatres and moving-picture houses having a seating capacity of less than 1,000, and having no permanent stage, may be constructed of all-metal, provided the floor area is limited to 16,000 square feet, when located on one street; 19,000 square feet, when located on two streets; and 22,000 square feet when located on three or more streets. Such buildings are, Webber explained, limited to one story in height. The approval of such buildings would, of course, be subject to the design complying with structural requirements as provided in the Denver Code. "I am unable to say what other cities and towns in Colorado," Webber continued, "might require for similar buildings."

DELAWARE

According to Teresa W. Ewell, executive secretary to Gov. Walter W. Bacon, Delaware has no state building inspector, building inspecting being in the province of the several municipalities.

DISTRICT OF COLUMBIA

City of Washington

The all-steel, pre-fabricated theatres as described could not, according to J. B. Daly, chief engineer, Department of Building Inspection, be built in the District under the Code and the Act of June 1, 1910. The District of Columbia Building Code calls for masonry walls and fully fire-resistive construction. The Act of 1910 required fully fire-resistive construction. "These buildings," states Daly, "are of exposed metal wall construction and fluted metal roof construction. Interior partitions are also of exposed metal construction. This type of construction is not fire-resistive as defined in the D. C. Building Code."

Deputy Director of Inspection Robert H. Davis declared, "I concur in Mr. Daly's report."

FLORIDA

C. H. Overman, director of the Florida State Improvement Commission, states that Florida has no general building code and, accordingly, no state building commissioner. Municipalities throughout the state have enacted various codes.

City of Jacksonville

Jacksonville regulations require fireproof construction for theatres seating more than 300 persons, states W. B. Simmons, supervisor of buildings. It would be necessary, he went on to say, to examine detailed drawings before decision could be reached whether the pro-

posed construction measured up to that standard.

ILLINOIS

All construction throughout the state of Illinois, where such is regulated, is governed by the various municipal building ordinances where the construction may be performed, according to Cornelius W. Macardell, assistant in the Division of Architecture and Engineering.

City of Chicago

Bluntly and to the point, Paul Gerhardt, Jr., Commissioner of the Department of Buildings, declares, "This type of construction is not in compliance with present building codes of the City of Chicago, particularly as applied to exterior walls."

IOWA

As long as these all-steel, pre-fabricated theatres provide sufficient and proper exits, and comply in every respect with the state law, there should be, according to John W. Strohm, state fire marshal, no objection to this type of theatre. However, several Iowa cities and towns have ordinances governing the construction of theatres.

MAINE

The insurance commissioner, under existing statutes, is the sole authority in the State of Maine having jurisdiction over the construction and licensing of theatres. "Before committing the approval of this department to such pre-fabricated theatres," declared Joseph A. P. Flynn, chief supervisor of the Insurance Department's Bureau of Fire Prevention, Inspections, and Investigations, "we would like to have for perusal, if at all possible, a copy of the plans and specifications of such pre-fabricated theatres."

City of Portland

A brief examination of the material did not show enough detailed information for the inspector of buildings to say whether the proposition would comply with the Portland Code or not.

MARYLAND

The chief deputy comptroller, J. O. McCusker, states that the State of Maryland does not have any building code covering the building of pre-fabricated theatres. The several municipalities have their own building codes.

City of Baltimore

The construction of all-steel, pre-fabricated theatre, as described, "does not seem to conform to the requirements of our Building Code, unless the volumes of such structures are below 100,000 cubic feet," declared H. F. Lucke, Jr., buildings engineer. "There is not," he continues, "sufficient detailed information, and, therefore, I do not feel that I am sufficiently familiar with the construction to make any further comments."

MASSACHUSETTS

An examination of the laws, rules, and regulations governing theatres in the Commonwealth of Massachusetts—as set forth in Forms A, B1, and C of the Department of Public Safety, as provided by Roy K. Beaudry, acting supervisor of plans—reveal nothing that is prejudicial to pre-fabricated theatres as such. The rules, as presented, are such that pre-fabricated theatres could be constructed in complete compliance. However, municipalities may have, in their codes, rules more drastic and restrictive than allowed in the more generally-phrased Chapter 143 of the General Laws.

MICHIGAN

In Michigan, according to A. N. Langius, director of the State Administrative Board's Buildings and Construction Division, it would be necessary that each pre-fabricated theatre comply with the building code in force within the local governmental unit in which the theatre is erected.

"It may be of interest to mention," Director Langius goes on, "that there is being promulgated in this state a standard 'Township Building Code' which, when adopted by the townships, will regulate construction in suburban and outlying territory. This state has no building code applicable to small communities. However, the state regulation with regard to minimum means of egress would need to be complied with. The authority for condemnation of any hazards lies in the office of the State Fire Marshal.

"This office is not aware of any official prejudice against pre-fabrication if the accepted standards and principles affecting the safety and well being of the public are adhered to. On the other hand, any form of construction promising to become a shambles if improperly maintained would, of course, meet with suspicion and discouragement."

MISSISSIPPI

According to William E. Barksdale, executive secretary of Mississippi's Building Commission, states there is no state building code, but "some cities have building regulations."

MONTANA

Inasmuch as Montana has no state building code, Sam W. Mitchell, secretary of state, advises that it would be necessary to comply with any ordinances relating to building in any cities of the state in which the construction of such pre-fabricated theatres might be desired. Such information could be obtained from city councils.

NEBRASKA

City of Omaha

Because the material in the published work was insufficient (insufficient, of course, only because the original source was too secretive on the important and critical details), Rodman M. Brown, chief engineer of Omaha's Building Department, was unable to reach any definite conclusions.

"It will be necessary to furnish us with complete working drawings," Brown said, "before it would be possible to determine whether the proposed structures would meet the requirements of our Building Code."

NEW YORK

City of New York

The building code of the City of New York, advises Edward P. Grovard, borough superintendent, Manhattan, requires construction which would preclude the erection of the described all-steel, pre-fabricated theatres.

IF BUILDING CODES AND THE MEN WHO ADMINISTER THEM seem tough and not amendable to "reason," let it be remembered that theirs is no lightly-assumed responsibility. Here is seen the type of fire damage that building codes endeavor to prevent. And in their efforts to prevent such loss of property, building codes must be exacting, and any structure, pre-fabricated or completely built on the site, must conform to the rules.

OHIO

After giving the material careful consideration, Edward M. Simpson, chief of the Department of Industrial Relations' Division of Factory and Building Inspection, stated that it is impossible to give a definite answer as to whether the prefabricated theatres discussed would meet with the Ohio Code, due to numerous details to be considered in the construction of theatres and assembly halls.

"There is no doubt," Simpson continued, "some of the construction and material used in the pre-fabricated theatres would meet the minimum requirements of the Ohio General Code. However, we would have to have more detailed information than is contained in this article before passing judgment."

OREGON

Oregon statutes relating to the office of the State Fire Marshal, under section 99-2809, covers these points: specifications for booth, protection of films in use, electrical equipment, care of operating rooms, exits, lighting, requiring approval for equipment.

"In cases which the law would not seem to cover," explains Seth B. Thompson, insurance commissioner (by E. A. Taylor, chief deputy of the Department of Insurance's Fire Marshal Department), "this office will approve installations which strictly comply with the rules and regulations of the National Board of Fire Underwriters.

"Of course, the state law only constitutes minimum standards and you may anticipate more stringent regulations which may be required by ordinance within the city limits of incorporated cities and towns."

PENNSYLVANIA

The idea of all-steel pre-fabricated theatres as a whole, says John H. Homart, chief of the Buildings Division of the Department of Labor and Industry's Bureau of Inspection, appears to have merit if for nothing more than raising the standards of building construction for the rural theatre owners. It has, of course, other advantages as outlined in the article.

In the absence of complete plans and specifications, Hobart said that his office was not in a position to offer very much in the way of criticism, insofar as the Fire and Panic Act and theatre regulations were concerned. The attention of owners of theatres of this type is called to the following rules for protection from fire and panic in Class II buildings theatres and motion-picture theatres): 203 (means of egress), 204 (exposure and courts), 205 (aisles), and 206 (seating).

"The one thing that we do want to register a protest on," declared Hobart, is the 'nut and bolt' feature which the article appears to stress. To this Department, a theatre is a permanent structure and all structural connections must be of a more permanent nature in assembling the building.

"Your attention is also directed to Rule 201, which governs the capacity insofar as the materials used in construction are concerned.

"In reference to the itinerant projection rooms for rural houses, there are no provisions in our Laws and Regulations for this type of set-up and before the Bureau of Inspectors could authorize the use of traveling projection rooms of this type the owners of chain theatres would have to petition the Industrial Board of this Department for permission to use movable equipment.

"The Board would probably pay particular attention to the protection provided between the auditorium and the portable objection and its location in respect to the use of the exits by the patrons, plus the usual safeguards which are required for a permanent projection room.

"We are pleased to note the 36-inch spacing back to back of the seats. The writer has personally been in favor of wider seat spacing for several years, having in mind both the comfort of the patron and the greater ease with which a building can be emptied both at the end of a performance and in case of an emergency.

"The one floor type of construction is preferred over the stadium type, but if our requirements are complied with, both types can be approved.

"The interior decorations, which are placed in canvas, would be acceptable if the canvas were flame-proofed and a non-oil paint used for the decorations."

City of Pittsburgh

The City of Pittsburgh, according to G. M. Boileau, superintendent of the Department of Public Safety's Bureau of Building Inspection, is not opposed to the idea of pre-fabricated structures, but each application for a building permit, if the size indicated, must be accompanied with complete building plans which would be checked against the city building code requirements.

SOUTH DAKOTA

According to a copy of Chapter 31.04, "Regulation of Public Buildings," submitted by Dean W. Loucks, state engineer, South Dakota makes no provision for pre-fabrication as such. It can be assumed that, as long as pre-fabricated theatres meet the requirements set forth in the 21 sections of chapter 31-04, approval should be forthcoming.

WEST VIRGINIA

City of Huntington

All-steel, pre-fabricated theatres, of the type described, could, according to F. S. Whitney, city engineer, meet the building code requirements of the City of Huntington, with the possible exception of the interior decorations, which are described as being on canvas. "More detailed information," says Whitney, "would be required."

"The smaller type theatre, as developed by the Horsley Company, Inc., apparently would not meet our requirements," Whitney added.

WISCONSIN

The information presented to the State of Wisconsin was deemed by P. H. Thern, assistant engineer of the industrial Commission, as not complete enough to permit saying whether or not the all-steel pre-fabricated theatre would comply with the requirements of the Wisconsin State Building Code.

"Before we could approve these buildings for use in Wisconsin," Thern explained, "it would be necessary that detailed plans showing the sizes of all structural members and other necessary construction data be submitted for approval."

WHETHER APPROVED OR DISAPPROVED by the various states and cities, pre-fabricated theatres are judged not so much on how they are put together as what is provided to prevent such occurrences as is pictured here. In the last analysis, building codes are not so much interested in how a theatre is procured as in how and of what it is made, so that life and property—of the theatre and the community at large—may be protected.

Plywood-Plastic Theatres for 16-mm. Movies

Morris Sanders Has an Idea on Emphasizing Belief in Pre-Fabrication, 16-mm. Cinemas

Out of the war have come three developments which are probably destined to play important roles in the drama of the motion-picture industry in the coming years: Plywood, plastics, and 16-mm. motion pictures.

None of these things is new. But, although known and used for many, many years, it took the war to raise them to new levels of importance, to eliminate one-time deficiencies, and to perfect new techniques of manufacture and use.

War gave impetus to plywood and plastics because of the scarcity and the critical nature of steel, iron, and other materials more normally used in construction. And when the Armed Services needed instructional material for the rapid training of many men in the arts and sciences of war, sub-standard motion-picture films and equipment were drafted for a new and important task.

And so it was that, out of the exigencies of war, plywood, plastics, and 16-mm. films advanced more in the past five years than they had in practically all prior time since their original development.

Coincident with these war developments, men have kept in mind the possible outlets for these materials in a peacetime world, and it was not strange at all that all three items converged upon the same thought: public entertainment. And, in view of the fact that, in the public mind in general, these three items carry overtones of temporariness and home use, it is also not strange that the idea of pre-fabrication should have come to pass.

So putting all these factors together, there has developed the idea of pre-fabricated theatres for 16-mm. exhibition, utilizing all the latest advancements in plywood and plastics.

Among the foremost architects who have paid considerable attention to the utilization of war-developed and other new material is New York's Morris Sanders, consultant on plastics, on product development, and on design. In his work he has been called upon to blend all three of his fields of special endeavor and effect developments in design of products made from plastics.

From his knowledge and experience, Morris Sanders has developed a firm belief in the future of pre-fabrication, in the future of plastics, and in the future of theatres for showing 16-mm. motion pictures. And to achieve that composite end, he has set his facile brain to work and has come up with the ideas herein presented for the first time to the motion-picture industry.

Before setting forth some of the details of the Sanders idea, it might be well to present a brief resume of what is back of the laminated plastic products such as might be employed in bringing the Sanders theatres to fruition.

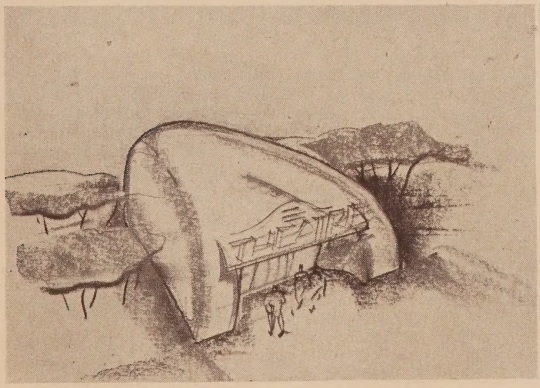
Engineeringly speaking, the process is a method of molding plastic-treated layers of material into curved or shaped structures by means of heat and pressure, using a single form. Thus, fibrous and other materials are bonded together by plastic resins which set firmly under low pressure and comparatively low temperature. Reinforcing members are formed simultaneously with the molding of the surfaces. The result is a structure lighter and far stronger than if it were made of plastics alone, a structure said to be actually stronger than an equal weight of steel. The process employs hydraulic pressure, exerted equally in all directions, as contrasted to the high-pressure two-die system.

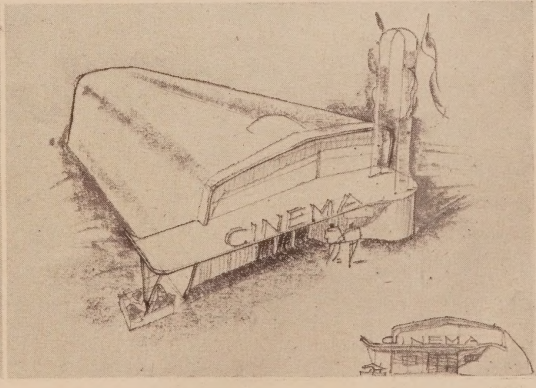
Almost any material is a potential for the plastic reinforcement by this process. Among the better known materials which have been successfully molded are wood veneer, paper, pulp, sisal, fabrics, Fiberglas, and combinations of two or more of these substances. Fibrous plastics can also be combined with aluminum or steel and simultaneously bonded. The "sandwich" type of construction—a lightweight core between two high-strength surface layers—opens up many new possibilities for the process.

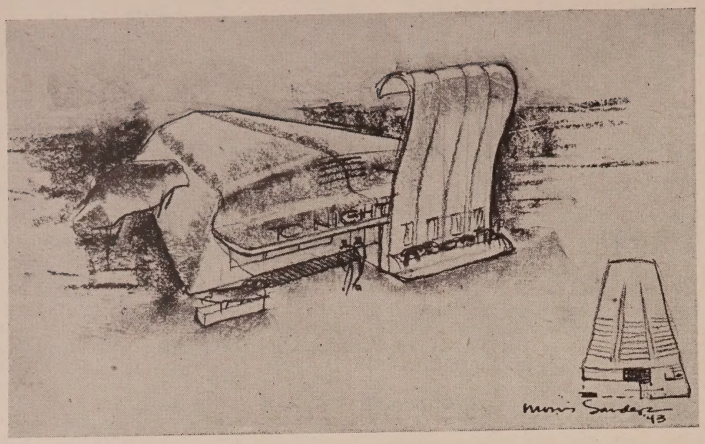
The low-pressure plastic molding results in a reinforced laminated plastic product possessing, it is said, these characteristics: (1) Higher strength-to-weight ratio than elsewhere obtainable; (2) low die cost, with single molds of non-critical, inexpensive materials made at only a minute fraction of the conventional matching steel dies; (3) compound curvatures are readily produced; (4) materials of different or even opposite characteristics can be bonded together to retain the good points of each; (5) a minimum of equipment and skilled labor is required; (6) the materials are waterproof, warp-proof, insect-proof, and rot-proof; and (7) they may be made in appealing colors by adding pigment to the plastic.

In this plastic-conscious age, it is not idle speculation to predict a great future for the low-pressure molding of larger and more complex structures. Designers will enjoy a field day, for this method of forming curved surfaces opens up new vistas for their imaginations. During

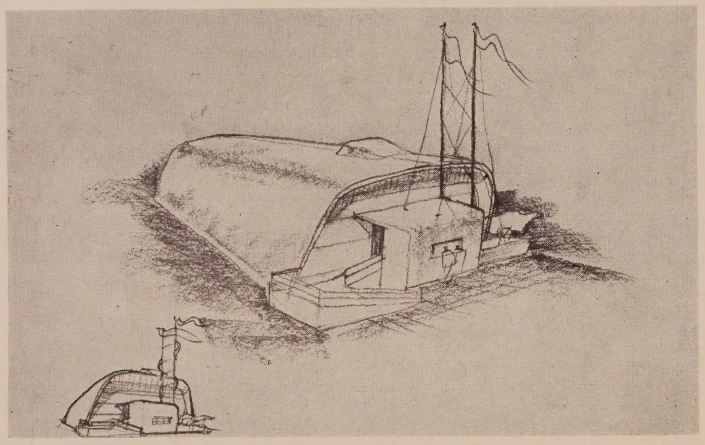
PLASTIC-PLYWOOD THEATRES for showing of 16mm. entertainment films have been proposed by Morris Sanders, noted New York architect and designer. On this page and the following one are sketches of four variations of the basic theme, set forth at the left below. Here is the most simple of the designs, with little else than a horizontal name sign to denominate the structure a theatre. However simple it is, it remains, nevertheless, theatrical in concept—and the basic design lends itself excellently to embellishment in the best and most showmanly approved manner. The theatre would be demountable and partially pre-fabricated.



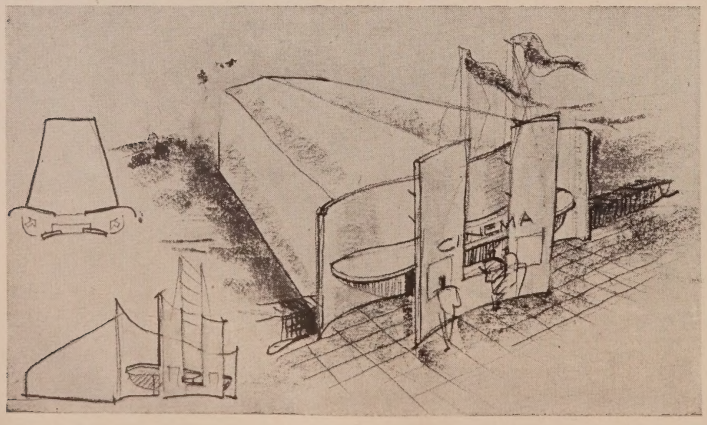




WITH AN INCLINED AUDITORIUM FLOOR, it might be desirable to utilize outside entrance ramps, as is sketched below. Morris Sanders, while "sold" on plastic-plywood and 16-mm. entertainment films, does not intend the sketches and plans here presented to signify that either he or industry is ready to fabricate these little theatres: They are presented merely as possible developments of a sound, though as yet untried idea.



THREE IDEAS, variations on a theme, are set forth by Morris Sanders as possibilities for plastic-plywood theatres, designed especially for the showing of 16-mm. motion pictures. As seen here, the plastic-plywood panels may be utilized in a wide variety of ways, to add variety and distinction to any locale. Towers, flag poles, and other ideas can add many interesting effects to these intimate houses for the cinemaless communities.



the war, hundreds of aircraft—from gliders to twin-engined bombers—had wings, noses, fuselages, flaps, or cowling fabricated by this method. In the future, unlimited possibilities obtain. In furniture and cabinets alone there is a vast realm of possibilities for such construction, and, too, especially in the making of those articles for models of which the public fancy changes faster than it is economically feasible to change the present die methods.

It is for such material that Morris Sanders has designed his 16-mm. theatre of the future. Molded in sections for assembly at the site, some of the panels measure nearly 50 feet wide in front, tapering down to 22 feet at the back, by some 65 feet long and about 21 feet high, excluding, of course, any towers or other additions which might be made to the basic plan. Such weather-resistant plastic-plywood provides for a durable structure, low in cost and practically unlimited in design.

On these pages are presented five rough sketches showing how the basic Sanders theme can be varied to meet the tastes of prospective owners. From these sketches, one has been developed in greater architectural precision. However, it must be remembered that the sketches and plans here presented represent no theatre either actual or contemplated—merely an idea, architecturally sound and economically feasible, which could, at some future time, be brought into the full flower of reality.

The theatre presented in more precise detail is especially designed for 16-mm. projection and, accordingly, no urban "palace" is contemplated; rather an intimate, 200-seat house of approximately 2,350 square feet, with a volume of about 42,000 cubic feet.

The sidewalls, of dry-wall construction, are made of stress skin plywood panels, about 7 feet wide, with the height varying with the intended location of the particular panel. The interior and exterior paneling is staggered, with the panels in either case bolted together with calked joints. Heat and sound insulation is provided. The theatre, obviously, is partly pre-fabricated and knock-down.

The roof, supported on four laminated wood trusses, is sheathed with 7-foot wide panels covered with a mineral surface composition, from roofing to gutter.

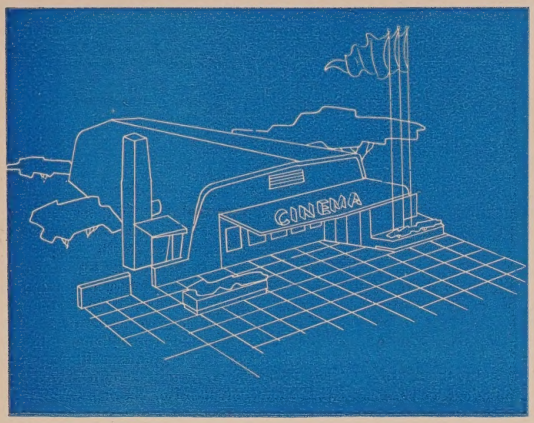
The dropped ceiling panel on the center of the auditorium is plywood on the bottom of the trusses, thus concealing the lighting and ventilation ducts. A sound reflector is installed over the raised rear seats.

The floors are made of reinforced plywood panels on wood girders and posts.

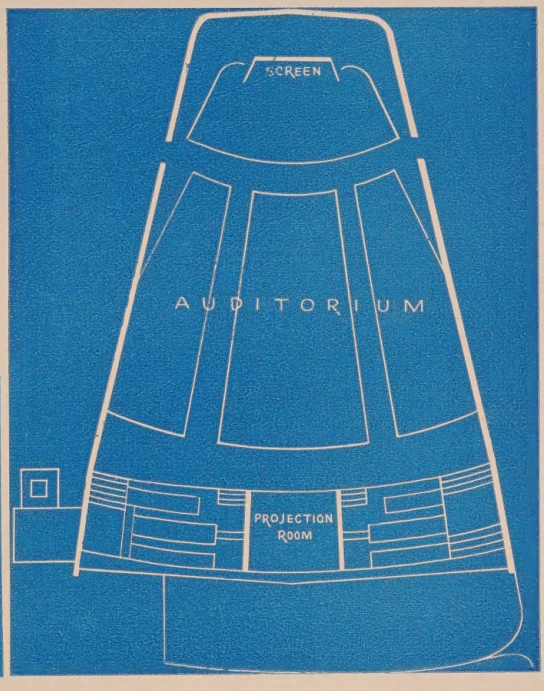
A special chair is being designed, made of molded plywood, with foam rubber padding. In plan, the seat nearest the 8-foot-wide screen will be 16 feet from the sheet, and the chair farthest away will be 55 feet.

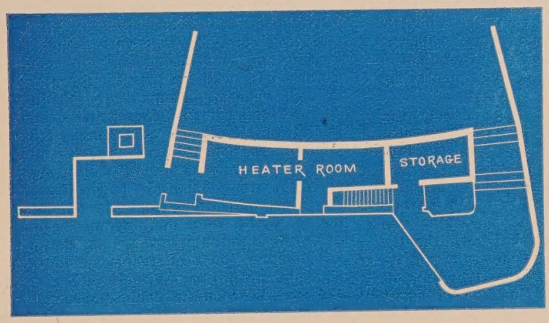
Forced hot air, with the ducts beneath the floor will be provided, and the circulatory system will be adaptable to summer cooling. The fuel to be used will depend on the location of the theatre.

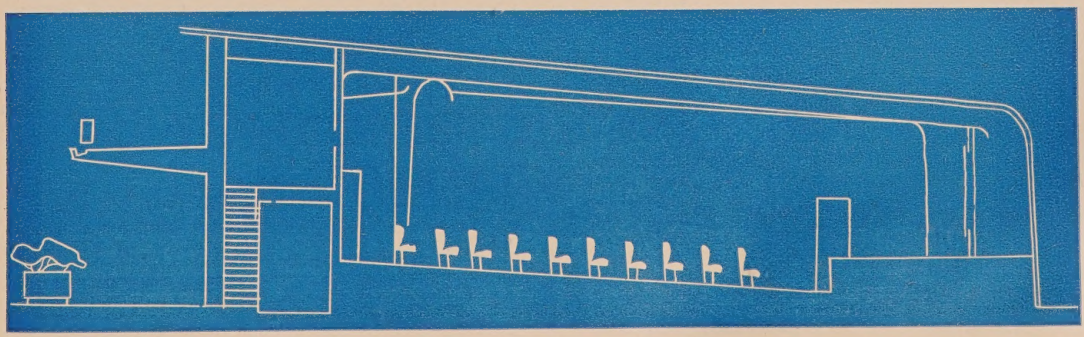
While the front section of the theatre will have some plumbing, no provision is at present made for public toilets.



WITH GREATER ARCHITECTURAL PRECISION, Morris Sanders has developed his ideas on a plastic-plywood theatre for showing 16-mm. motion pictures to a "blue-print" stage, where the structure takes on greater reality. While still an idea, shown on this page are what might be developed. Upper left is a rendering of the basic idea shown on other pages in sketch form. Upper right is the front elevation of this theatre. At the left is the ground plan of the theatre, with the lower-level plan immediately below. And at the bottom of the page is the longitudinal section. Entering the theatre at the left, the patron mounts several steps to come to the auditorium cross-over at the upper end of the inclined floor. The exit meant to be used as such is at the right. A separate stairway leads to the projection booth, on the near second-story level. Below the projection booth, and the three flanking rows of seats, arranged in a quasi-stadium effect, is the heater room, storage space, and the box office. Inasmuch as this is still an idea, some of the details of the original study have been omitted from these drawings, but enough has been kept to indicate that here is the start of a trend. Should a demand arise for this type of theatre, it could be developed in a strictly permanent basis and fully equipped with all modern accoutrements for that kind of patron comfort which is sought in the modern theatre in any community.







Pre-Fabrication in the Post-War Expansion

Pre-Fabricated Theatres Seen as Headache In Domestic Program of Cinema Development

By LEO YASSENOFF

The F and Y Building Service

The announcement several months ago that unquestionably substantial people financially able and financially competent were ready to embark on a vast program of pre-fabricated theatre construction immediately became the most exciting topic in the exhibition trade.

The excitement attending this announcement was in no way lessened by the fact that the financially responsible name of Charles Skouras, the head of the National Theatres Amusement Corporation, subsidiary of a large producing and distributing company, was prominently published as the head of the movement.

When it was announced that Industrialist Henry J. Kaiser had already agreed—and was possibly under contract—to manufacture these pre-fabricated theatres as a post-war project in one of his vast ship-building facilities, the interest and excitement was even greater.

There are several premises upon which the writer bases his opinion that pre-fabricated theatres will die a natural death in the U. S. domestic market.

Pre-fabricated products are generally not first-class, because they are not adaptable to various climates, weather conditions, and other physical limitations.

The actual rate of depreciation in pre-fabricated buildings of every type has been five times as great as the depreciation in well constructed, permanent buildings of similar materials.

The maintenance cost of pre-fabricated buildings is far greater than the maintenance cost on permanently built structures. We have just been through the greatest wave of pre-fabricated homes and houses that the country has ever known. Instead of proving that this method was the least expensive and the most practical way of determining the problem of low cost homes, it has definitely proven that pre-fabricated houses are more expensive to construct, more expensive to maintain, and that the depreciation is much greater. No doubt some of this experience arises from the fact that, in pre-fabrication of buildings, at least 35 to 50 per cent of the work involved must be performed by workmen in the field.

Among these tasks are excavation, plumbing and heating, final decorating, foundations, floors, outside walls to a point above the grade, all piping below the floors, all tunnels and duct work below the floors, all wiring, and all field erection of all kinds. These items will cost more than they would proportionately, because they will be more intricate and more difficult to perform due to extreme cutting and fitting.

The outstanding mass production items today are automotive equipment and a series of small items such as radios, washing machines, and domestic equipment. These items represent comparatively small financial risk and the average buyer is more willing to take a chance on this type of pre-fabricated item, because he can see it already to be delivered, assembled and intact, for a given established price.

The element of chance involved, together with the unestablished cost of the items not purchasable on a mass production basis, which are outlined in a preceding paragraph, will make it more difficult to convince the buyer that he should take a chance on pre-fabrication.

In order to achieve the proper value out of a production line, a consistent regularly yearly volume must be available. One must stop to think that, at the present time, counting all of the small and large houses, throughout the country, including every storeroom, theatre, and shooting gallery, there is only a total of 17,000 theatres. It is very difficult to conceive that one agency can ever develop a true production line which could turn out as many as 750 to 1,000 theatres every year, of any model or design.

This fact alone will prevent the establishment of pre-fabricated theatres at a price in the United States of America. It is easy to see that if such a production line could be established and if the normal number of theatres built by other plans and procedures would be added to the number thus produced and sold, we would end up with twice the number of exhibition outlets and a consequently demoralized exhibition industry.

The final and chief reason that pre-fabricated theatres cannot fill the need is one of cost. While we in America have been led to believe that pre-fabrication and production-line savings are brothers under the skin, that will provide fantastically cheap buildings, the writer believes that the cost of the pre-fabricated theatres described in the trade papers of the motion picture industry will, at all times, cost more than intelligently designed theatres properly constructed of the best materials.

At least, the writer believes that the pre-fabricated models shown will cost from $200,000 to $300,000 or more, completed and erected, exclusive of the site and equipment. Such budgets are beyond the realm of reason for neighborhood and small-town theatres. Such budgets are likewise in excess of available costs of similar jobs specially designed and constructed.

At a recent meeting of Independent Theatre Owners, it was reported that representatives of pre-fabricated theatres have estimated the steel requirements for a 1,000-seat house to be in excess of 350 tons. This item alone involves an erected field cost of from $50,000 to $65,000, without $30,000 to $35,000 worth of mechanical work, plus painting and decorating, grading excavation, floor and concrete work, sidewalks, and so forth.

Special shapes of a site or lot, unusual grades, special requirements of entrance and entrance grades will still be problems in the design of theatre structures. In addition to the above problems, differences in code requirements still remain. The designer or architect must wrestle with them continually.

There remains also the need and inspiration of special architecture, with its attempt to interpret the spirit of the theatre to be erected in terms of its relation to the community it serves. The structure itself, if it is designed in harmony with the feeling of its community, has in itself made an initial progress toward a successful operation.

All over America, private architects and contractors are producing 1,000-seat houses in the price range from $90,000 to $150,000, depending on local conditions, site problems, labor conditions, type of air conditioning, and the elegance of the design features, exclusive of seats, sound, carpets, and booth equipment.

Accomplishment of a top result depends on giving each job individual study and care and attention and the elimination of lost motion in the performance of the design and construction of each building.

A certain amount of standardization is acceptable. Projection layouts can be standardized. The general method of heating and ventilating and air conditioning can well be practically standardized. The establishment of sight lines can be standardized. The electric-wiring layout for the booth and sound, exits, and curtain control can be reasonably similar in various layouts. However, when the arrangement of the theatre and the front elevations and the entrance lobby, foyer, and auditorium become stereotyped and standardized on the production line, the total result is likely to be disappointing, to say the least.

The entire Skouras promotion seems to be based on the belief that the pre-fabricated models are cheaper than theatres from competitive constructing sources. This belief on their part may be erroneous. Mr. Kaiser, no doubt, is not interested in this point and takes it for granted that, if Mr. Skouras is willing to sign a contract to pay, he, Mr. Kaiser, will deliver certain work.

It is possible that there will be a market for pre-fabricated theatres of this type in India, China, Burma, Africa, or other distant points. The writer is not competent to appraise this market.

For the many reasons outlined above, I am loath to believe that pre-fabricated theatres will ever be anything but a headache to its sponsors and promoters if it depends on continental United States for its market.

Road Showmen: Opportunities and Problems

Mobile Booths, Serving Several Theatres Held a Boon for Cinemaless Communities

By WILLIAM C. DEVRY
President, DeVry Corporation

The manner in which motion-picture road-show operations are increasing, along with the almost daily announcements of new motion-picture-theatre building projects, reminds me of a story the late James J. Corbett used to tell about his dad.

"Gentleman Jim," you know, gave up a career as a banker for that of a prize-fighter. When he told his father that he was really on his way to his first major fight, the old man solemnly shook his head and said:

"Jimmy, m' boy, it's a sorry move you're making this day, and please to remember as long as you live it was your old father who told you that 'a rolling stone gathers no moss'!"

A few days later, however, Champion Jim Corbett returned and dropped five crisp $100 bills into his father's hands.

"You got this for prize-fighting?" Corbett senior demanded to know.

"I did," Corbett junior replied.

"Jim," observed the old man, earnestly, "remember always it was your old father who told you, 'it's the rovin' bee that gathers the honey'!"

In other words, there is new and bigger box office for the regular motion picture exhibitor—and "there's gold in them thar hills," too, for the road showman. There is easy money and quick fortune for neither of them—but there is good show-business crying to be developed both at home and abroad—in local neighborhood, near-by suburb and outlying community—as well as in the far corners of a world where movies, "the universal language," may be making a vital contribution to a slow but sure realization of the late Wendell Willkie's "One World."

THE BUILD-UP

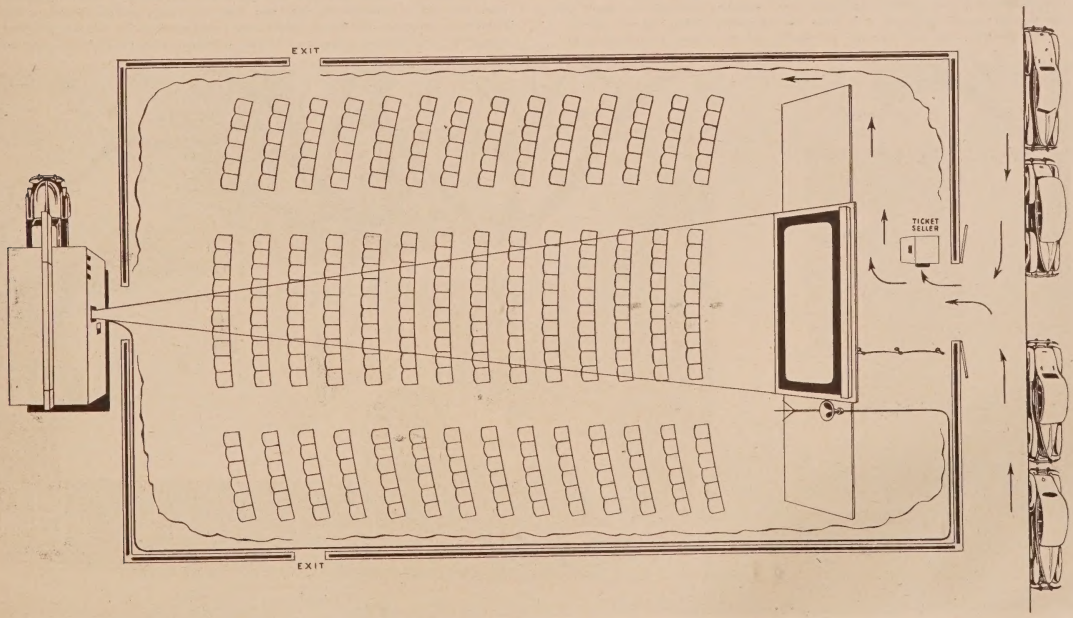
As I consider the market for movies open to the road showman, I think back, four long decades ago, to the earliest experiences in the motion-picture industry of my father, the late Dr. Herman A. DeVry. Herman DeVry was a road showman, traveling from town to town with a motion-picture production, entitled "Around the World in 80 Minutes."

His early vision also encompassed the modern newsreel, for shortly he had added "The Battle of Manila" and "McKinley's Funeral" to his programming.

And it was Doctor DeVry, you may recall, who visioned the road showman's need for portability in his projection equipment. It was "to take the wonders of motion pictures out to the crossroads, the class, conference, and living rooms of the world," that Doctor DeVry developed his suitcase projector—the portable 35-mm. projector that today is on exhibit at Washington's Smithsonian Institution, along with other of the world's "firsts."

In view of Doctor DeVry's pioneering, it is axiomatic that we of DeVry should have a wealth of information, data, and first-hand experience upon which the prospective road showman may feel free to draw. Out of this experience, our first admonition to him is that he give most careful consideration to his market. And the factors that enter into market consideration, from the standpoint of the traveling motion-picture exhibitor, are many.

THE SHOW GOES ON. Here is a sketch of what might be almost any available space, converted into a theatre serviced by the mobile projection booth. The truck moves alongside the pre-arranged port in the rear wall of the building, and the crew installs the screen and the loud speakers. The ticket seller sets up the box, and everything is ready to go. A refinement of this project would, of course, include a permanent house screen and built-in speaker systems, in which case only a connection would have to be made at the rear wall beside the truck. Being a sound truck as well as a projection booth, its crewmen are publicists, too.



THE "MARKET"

"Market" for the road showman means a succession of communities, each of which is large enough to assure a profitable "take." One community may be good for one day a week, another for more. The best week-end communities (Friday through Sunday) must be carefully determined. Box-office net is the determining factor.

"Market" means more than population, however. Facilities available for putting on the show are of utmost importance. And this brings us to a suggestion the writer feels is well worth considering.

Movies are an attraction which keeps people in their home community, as well as bring them to a community where they are shown. Movie-goers make business for a community, as well as for the exhibitor. So why not work out a cooperative deal with the community? Let it provide the "theatre" and you provide the show. Be willing even to pay a rental which will partially cover the "theatre's cost over a period of time—but make it a civic proposition which can be a good-will and audience builder for the exhibitor, as well as a business stimulator for the community.

STORES INTO THEATRES

Illustrated herewith is an idea as to how a vacant store building can be converted into a motion picture theatre—and for general meeting use by the community when the road showman is not using it.

This illustration shows the road showman's use of a mobile unit as built by DeVry for both 35-mm. and 16-mm. equipment for use by governments to take informative films into remote areas, for university extension courses, for business, sales and training films, and also for both major United States political parties.

The particular mobile unit suggested in the illustration has a side port, making it possible to move the "mobile projection booth" into position at the building's rear for the period of the show.

"ITINERANT BOOTHS"

Mobile units, as built for the Russian army, are complete even with sleeping and toilet facilities. They provide their own power through a 5,000-watt gasoline-powered generator.

Depending upon the scope of his operation, and the variety of conditions under which he must exhibit, the road showman can determine the type of equipment best suited to his needs. Mobile units, such as used by the USSR, easily accommodate standard 35-mm. theatre equipment. The road showman may find it advisable to use 35-mm., as well as 16-mm., equipment. He may even find occasion to use both in a given community.

Increased use of motion pictures by educational institutions, churches, agricultural extension units, and business, suggest many profitable auxiliary markets for the road showman's equipment.

All of this must have a place in the road showman's consideration and preparation of his market, and the selection of the type of equipment best adapted to his needs.

Experienced road showmen will tell you in all sincerity, however, that you need capital with which to start, and that you need to be a businessman, as well as a showman, to make a success out of the business.

It costs just so much to open the doors on a motion-picture show—be it theatre or road show—and this cost for the road showman can be "35-mm.-high," so to speak, or "16-mm.-low" insofar as projection and sound equipment are concerned. Then there is the minimum personnel requirement, as well as transportation and film rentals. And there are theatre rentals, too—whether it be hall, auditorium, vacant storeroom, or tent.

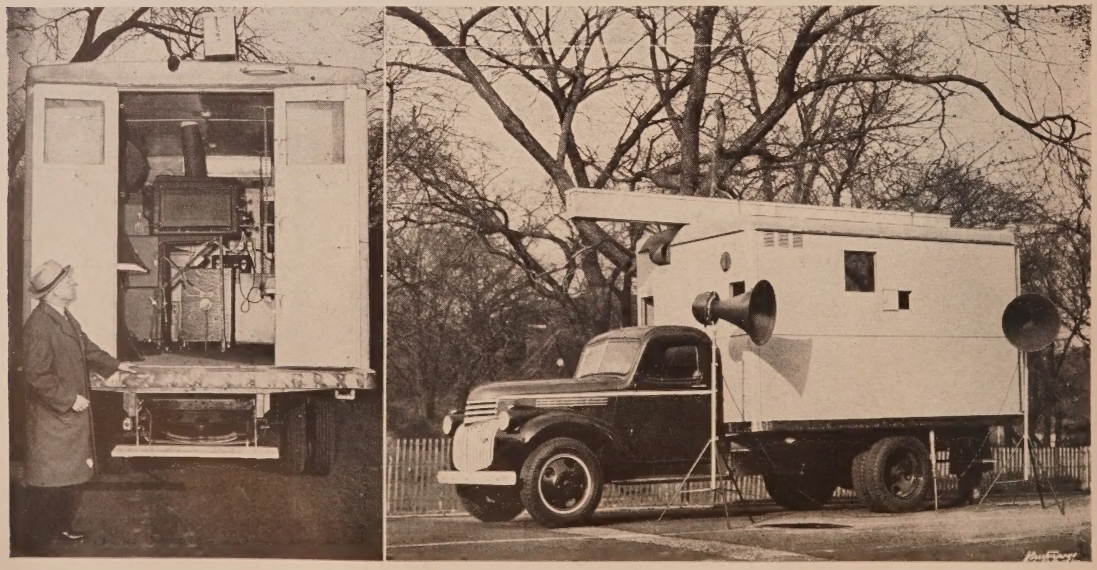
THE FUTURE

The foregoing paragraphs suggest a consideration of the subject as to who is best suited to go into the road-show business—and here I want to second the suggestion of many who feel that it is not too soon for the theatre operator to be giving careful consideration to the possibilities of developing his own road-show business.

A parallel is sighted into the growth of the small loan and installment finance companies, both of which made millions out of a financial service which banks and trust companies later came to realize might just as well have been theirs had they envisioned its profit potentiality.

There is a genuine demand for motion pictures in hundreds of communities which cannot afford elaborate theatres. There is an increasing number of 16-mm. films being made available for showing in these communities, with 16-mm. projection and sound equipment capable of theatre standards of performance readily available, as also are mobile units designed for both 16-mm. and 35-mm. equipment's safe, speedy and economical transportation and use.

THE "ITINERANT BOOTH" was originally developed by the DeVry Corporation two years ago for use by the Russian Army for motion-picture and radio entertainment and education. The fire-proof unit, such as might be adapted to the uses described in this article, is complete with a gasoline generator to supply all the electrical power required to operate the equipment. DeVry 35-mm. motion-picture theatre-model projector, a high-fidelity sound system, a Hallcrafter all-wave radio, Shure Brothers' microphones, Jensen loud speakers, astatic pick-up phonograph unit, fire-proof film cabinet, film splicer and rewinding apparatus, special Baldor rectifiers, Strong lamps, a Da-Lite screen, and other equipment. Thus, the truck is available for duty any time, anywhere, and not merely a perambulating projection booth. Air-conditioned living quarters for two are provided. Altogether, the unit is a theatre in itself, awaiting only twilight to function.



Metals in the Service of the Theatre

The Common and Not-so-Common Metals Find Many Uses in Construction and Decoration

By Dr. Bruce W. Gonser
Metallurgist, Battelle Memorial Institute

Two classes of metals and alloys are employed in architectural service—the unseen, which are rated strictly on utility, and the seen, rated on a combination of utility and aesthetics. Fortunately, there is now such a wide range of metals and alloys from which to choose that both considerations can be satisfied.

Metal fitness is governed more by resistance to corrosion than by any other factor. Since conditions vary, consideration must be given to differences in the rate of corrosion or surface change when the metal is used in dry, rural, or interior locations and when it is used near the seashore or subject to corrosive gases or constant dampness.

Improvements in alloying, in the state of purity of metals obtainable, and in metal-working equipment have now made available suitable metals for use in a wide range of forms—from wire, cable, tubing, rod, extruded, and rolled shapes to sheet, strip, and intricately stamped, forged, and cast forms. Likewise, surfacing can be varied from a dull, matte, or sand-blasted surface to a mirror finish with various highlighted and in-between stages.

There is less scope in colors, yet well-known combinations of white, shades of yellow and copper-red in natural colors, and several patina colors are readily available. Some alloys other than copper and gold base alloys are naturally colored, but, unfortunately, they are brittle and must be used as castings or surfacings. Thus, in using metals for decorative, as well as for structural, purposes, considerable design flexibility is given the architect by the wide scope of raw materials available.

It is expected that an increased "clad era" will come in the post-war years with an increased use of aluminum-, stainless steel-, nickel-, and copper-clad steels. Also to be expected is metal-clad plywood, employing steel, copper, or aluminum as the cladding material.

War demands virtually stopped the civilian use of metals. With industry reconverted to peace, in efficiently operated plants, and with the manufacturing and marketing know-how, the United States should be in an excellent position to provide tailor-made metallic products for specific applications, to gain advantages of inherent properties of metals and their alloys.

It is well to consider the important metals and their alloys, reviewing the present situation and possibilities of the future in decoration and construction.

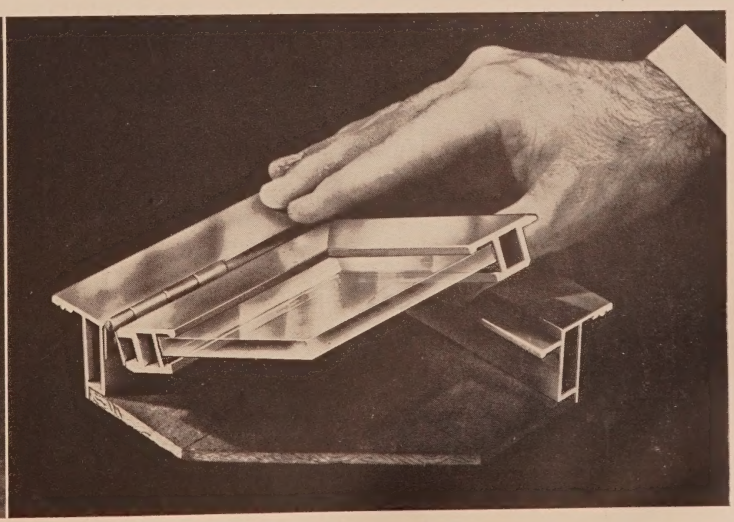
ALUMINUM

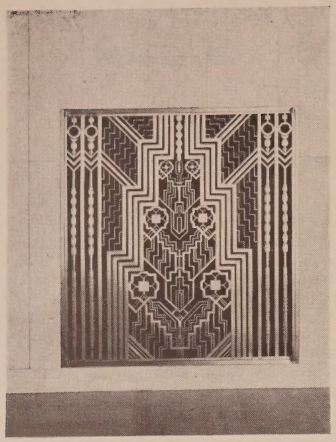
One of the most important metals used for decoration is aluminum. Its lightness—about one-third that of steel or copper—is a decided asset for many applications and makes it an economical metal to use on a volume basis. It can be cast, formed by extrusion, pressing, spinning, or rolling, and machined and welded. Hence, it is readily converted into practically any shape or form desired.

For increased strength, aluminum is alloyed with copper, silicon, manganese, magnesium, zinc, or combinations of them. Such alloys as duralumin are seldom used for decoration, unless high strength is essential, since it is less corrosion resistant than aluminum alone. An aluminum-base alloy with 2 to 9 per cent magnesium is much used architecturally, especially in Great Britain. Some of the aluminum alloys developed during the war can compete directly with structural steel on a strength basis, without considering the advantage of lesser weight.

Aluminum acquires in air a thin transparent oxide coating, which is effective in preventing further attack. Even when attacked by particularly corrosive conditions, as along the seashore, there is no staining of adjoining materials. A heavier oxide coating, electrolytically produced, is harder and more resistant to wear and weathering, and can be dyed to practically any color. Both the oxidized surfaces and colored finishes will resist atmospheric conditions. The darker colors are recommended for ex-

ALUMINUM IN THE THEATRE is becoming common, especially when employed as display frames. In these photographs, furnished by the Universal Corporation, are seen some details of that company's Sealuxe line. At the left is shown a partially opened frame showing a poster in place, and also the date strip, which can, of course, be changed as the occasion requires. At the right is seen a cut-away model of the frame, showing the type of braced construction and the method of mounting the glass. The sturdy frame is mounted with the substantial back board that will take many thumbtacks and much more wear.





GRILLES, to mask heat and cooling outlets, can also be made of architectural bronze with telling effect as is shown in this photograph used through the courtesy and cooperation of the American Brass Company.

terior use, as they change less by accumulations of dust. Periodic cleaning is required to keep them in good condition. Castings may be given special finishes, such as the Aluminum Company of America's green Alumilite.

The classic example of aluminum applied to architectural purposes is the capstone (a solid pyramid 4 inches on an edge) of the Washington Monument, Washington, which, when it was set in place in 1884, was the largest pure-aluminum casting ever made. After 50 years, it was inspected and found in perfect condition. Until the cost was drastically reduced and architects became familiar with it, little aluminum was used until about 1925, since when it has been used in increasing amounts, first as shingles and tiles for roofs, then as spandrels, window trim, and the like.

Lightness of aluminum has aided in making it a preferred material of decoration in many skyscrapers. Thus, aluminum spandrels are used in the Chrysler, Empire State, and many of the Rockefeller Center buildings, New York, as well as in buildings in other cities. Since aluminum extruded shapes became available, they have been used extensively for window jambs and sills, trims, and fronts.

Aluminum doors are made from sheets and extruded sections. Facades, marquees, grilles, spandrels, stair railings, light fixtures, hardware, skylights, entrances, lobby frames, signs, and letters can be made from aluminum. Statuary cast in aluminum is becoming common. Now that parts may be anodized and dyed, interesting color combinations, or differently colored parts of the same casting, are possible.

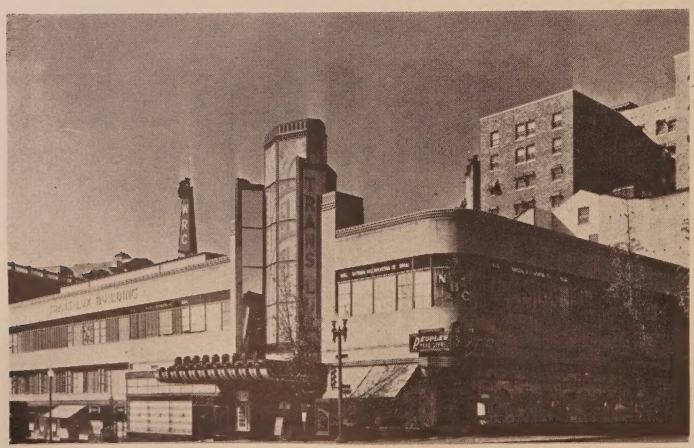
One of the exterior decorative applications of aluminum which should be mentioned is the use of flake aluminum in paint. Aluminum-foil trimmings and stamped pieces are reduced to a powder, then incorporated into a suitable vehicle.

Another material of construction that appears to be particularly promising for the future is aluminum-coated steel. This can be made by hot dipping, as in making the best grade of galvanized iron, and the cost probably will be but little more than for galvanized iron.

The rapid growth of aluminum and its alloys in construction and decoration of motion-picture theatres should continue, since increased volume of production permits a lowering of cost. The use of colored surfaces and the advantages of lightness are favorable.

As a future possibility, the Bohn Aluminum and Brass Corporation has suggested the possibility of a tent of aluminum, said to have advantages of durability, attractiveness, and showmanship. The idea might be developed in the pre-fabrication field, although the company declines to expand on the possibility.

THE USE OF ARCHITECTURAL BRONZE for decorative trim, for stores as well as theatres, is set forth in this American Brass Company picture of the Trans-Lux Building, Washington. Bearing the trade mark "Anaconda" —a name no less famed in modern metallurgy than it was in the good old days of the wild and woolly west, —architectural bronze has many possible uses within the theatre in the field of decoration as well as utility.



COPPER

Copper is used very extensively in decoration, both as the commercially pure metal and in alloys. Alloyed with zinc, it forms a series of brasses; addition of tin gives true bronzes; nickel and zinc added to copper form the nickel silvers; and with aluminum the strong aluminum bronzes result.

As thin sheet or strip, copper is much used for roofing, gutters, eaves troughs, ventilators, flashing, skylight construction, and, to some extent, vertical siding. The metal and its alloys is also utilized for water pipes, gas and oil pipes, water storage tanks, and heating lines. As an example, nearly 500,000 pounds of copper were used in the roof of Grand Central Terminal, New York. The most used type of copper roofing has been 24-gauge (16 ounces to the square foot), annealed sheet, with double locked, standing seams. Some 20-ounce sheet has been used, but the tendency has been to decrease the thickness to about the 10-ounce material. With added horizontal lapped seams of copper strip, tile roofs may be simulated.

From the decorative standoint, the chief value of copper is the soft green patina that develops in a few years. This basic-sulphate coating can be produced artificially. An electrolytic patina can also be developed, but the appearance is not quite like that of the natural forms and the coating is sufficiently soft to be removed or streaked by any abrading action. In time, the basic carbonate formed in the treatment is converted into the natural basic sulphate. Near the seashore, the patina may consist of a mixture of the basic sulphate and chloride.

To retain the natural color of copper, a thin, clear, vitreous-enamel coating can be fused over the surface. The resultant product is reasonably flexible, but little use has been made of it, although it appears to have some marked advantages as exterior decorative material.

Copper has been used in pre-fabricated structures. Likewise, there are buildings which have sides, balconies, roofs, and supporting columns sheathed in copper. Sections may be painted for contrasting colors. Panels stamped from cross-crimped, 16-ounce copper, backed by insulation board, have been used as building material. Even the very light 2- or 3-ounce electro-sheet can be used for sheathing, where the strip can be backed. A novel use of sheet copper has been for permanent awning. Of a more purely decorative nature is the sheathing in copper of statues (as the Statue of Liberty), stampings, spires, signs, and the like. Lightning rods can combine copper's excellent electrical conductivity with decoration.

Copper Coated with Aluminum Foil

Copper coated with aluminum foil can be used to give a silver effect (as on the dome of the Waldorf Astoria, New York) or used as a base for a chromium-plated surface. The latter is used as pre-fabricated material to be stamped or formed into decorative effects.

Lead-Coated Copper

Lead-coated copper is more important in decoration. It is used to a considerable extent for sheet-metal work—roofing, rain-water-conducting forms, cornices, spandrels, and other effects. It is very ductile, easily formed, and stamped, combining the strength and corrosion resistance of copper with the appearance and permanence of lead. This gives the metallic gray appearance of smooth lead to a dark, antique gray where a rough lead coating is used, both types weathering like lead. A sheet of annealed copper (16 ounces to the square foot) coated with 0.2 or 0.5 ounces of lead on one side is typical of the lightly-coated sheets, but lead coatings on both sides and as heavy as 5 ounces are used. The copper may be hard-tempered.

The Brasses

The brasses combine excellent workability with economy and fair corrosion resistance. These are, consequently, much used for decorative hardware, as door and window fittings, as well as for water piping. Muntz metal (60-40 brass) is well adapted for extrusion and stamping. Yellow brass is readily drawn. Extruded and drawn sections are available in a wide range of shapes used for molding, door frames, transom bars, window frames and supports, cornices, flutings, and similar sections. These drawn sections have a natural bright finish, but the extruded ones possess a satiny or matte surface.

If brasses are not polished frequently to retain the original colors, a gray, brown, or black patina is gradually formed. Artificial patinas can be produced and used for pleasing decorative effects. Combinations such as patinas, or of the original colors (varying with the composition from a copper red through various shades of yellow to a straw or nearly white color), can be made to give striking effects. Lacquer as used in the past preserves the original colors only temporarily, but some of the new lacquers developed recently give promise of reasonably good protection for both indoor and outdoor exposure.

Bronze

Bronze, strictly speaking, is an alloy of copper and tin, but this term now includes copper-base alloys in which zinc, silicon, aluminum, or manganese replaces part or all of the tin. The form of bronze most used for decoration has been castings, since a tin bronze makes an excellent sharp casting which is always much valued for statuary, plaques, and inscriptions. Bronze, brass, and copper spandrels for ornamental work are common, as well as fronts, entrances, and balustrades.

Nickel Silver

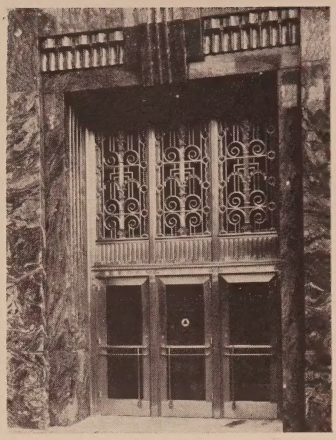
Nickel silver—known also as German silver, Benedict nickel, and "white metal"—is really an alloy containing more copper than nickel—and no silver! Actual composition varies with the method of fabrication and the proposed use.

Mechanically, the nickel silvers are excellent for structural members as well as decoration. They may be cast, forged, and fabricated by all the usual methods of forming, giving a wealth of structural forms and shapes from which to construct decorative grilles, window guards, hardware, trimmings, and castings of all sorts. These properties, combined with pleasing color and fair resistance to weathering make the nickel silvers the most-used, nickel-containing, non-ferrous alloy for exterior decoration. As a class, the nickel silvers attain a brown or green patina on weathering, unless kept polished. The speed of patina formation is accelerated by seashore conditions and by industrial atmospheres.

Aside from the usual white nickel silvers, it is possible to produce castings having moderate coloration by keeping the zinc and nickel contents comparatively low. Thus, light pink, yellow, green, or blue can be made and used effectively.

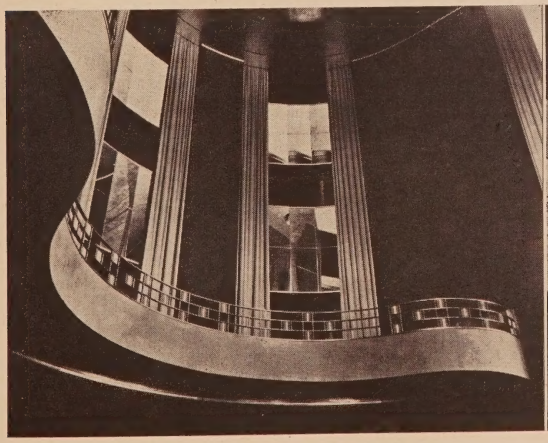
Applications of the nickel silvers in decoration are many, being most frequently found in interiors or in semi-sheltered places. Of particular importance are the applications at entrances and windows of office buildings, shops, and theatres.

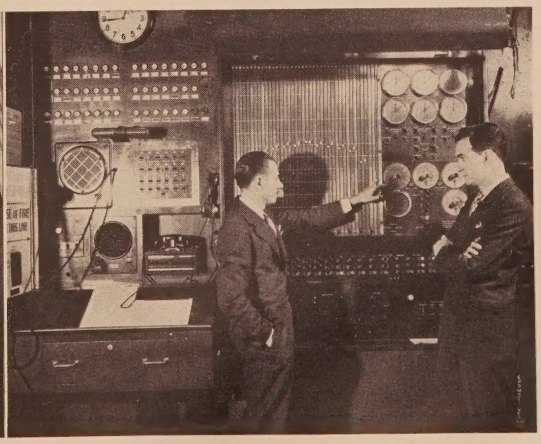
Despite the inroads of stainless steel, the brasses and bronzes are still in demand, and will continue to be. Aluminum has already cut into the use of copper in the electrical industry, particularly in transmission lines, but because of its current-carrying capacity, copper is almost mandatory for use in motors, generators, and other important items.



BEAUTY AND UTILITY are well combined in architectural bronze, as exemplified by this whole doorway to the Tri-State Telephone and Telegraph Company Building. (American Brass Company photograph.)

RADIO CITY MUSIC HALL, in New York, probably has utilized more copper, brass, and bronze than any other theatre in the world. At the left, like a graceful curve of a cello's bow, is the balcony with its brass decorations overlooking the grand foyer. At the right is the elaborate stage control board, containing in its electrical mechanisms a large tonnage of copper and brass. The copper-leaf ceiling of the grand lounge is also an effective utilization of the metal, according to the management of the Music Hall and the Copper and Brass Research Association, through whose courtesy and cooperation these photographs have been used here.





BOX-OFFICE DOORS add a decorative touch to the theatre. Here, at the Colonial Theatre, Phoenixville, Pennsylvania, the door is constructed from the Republic Steel Corporation's Enduro stainless steel.

Speculum Plating

Speculum plating, of the Tin Research Institute, using a coating of about 45 per cent tin and 55 per cent copper ("white bronze"), imparts the color of polished silver to steel, iron, tinplate, nickel-silver, copper, brass, bronze, silver, pewter, and the like. The plate is corrosion- and tarnish-resistant, retaining its luster for long periods of time. Among the items suggested for this finish are lavatory fittings, furniture, hardware, show case fittings, and business machines.

IRON AND STEEL

Iron has been used for centuries in architectural decoration, in spite of the necessity for protecting it from corrosion.

Iron

Wrought iron has long been a favorite metal for flashings, hinges, grilles, balustrades, and the like. Real wrought iron—whether made by "puddling" or modern methods—is considered to have fair resistance to corrosion, due to its phosphorus content and slag included in the metal. However, most of what is known today as "wrought iron" is merely low-carbon steel.

An increasing use of wrought iron may be found in radiant heating installations. Ordinary radiators, however, are cast iron.

The presence of chromium increases remarkably the resistance of cast iron to the effects of heat. As little as 0.5 per cent causes definite improvement, and cast iron containing about 1 per cent of chromium can be exposed to temperatures as high as 1,400 degrees for long periods with no ill effects. No other alloying element, according to the Electro Metallurgical Company, is as efficacious as chromium in this respect.

Chromium also imparts increased resistance to wear and abrasion and increases hardness and resistance to corrosion.

Improved methods of tinning cast iron have been developed, according to the Tin Research Institute. Stronger soldered joints will increase durability and a reliable bond between cast iron shells and white metal bearings will simplify and cheapen many bearing designs and facilitate important economics of metal.

Low-Carbon Steel

Low-carbon steel is much used as the basis for surfacing and decorative structures. Here, the actual steel surface is not visible, since it must be protected by a complete covering of paint, enamel, or non-rusting metal.

One of the most successful coatings for sheet steel in decorative applications is porcelain enamel. First used about 15 years ago as a roofing tile, applications have been expanded to doors, walls, panels, and various decorative effects. Porcelain enamel for architectural work, especially in theatres, is probably the most permanent, colorful, easily-handled structural veneer obtainable. Indications are that the post-war uses of this material will involve even more building applications.

Stainless Steel

Since the big drawback to the use of iron and steel has always been rusting, the dream of metallurgists has been to make a non-rusting steel. With the development of ferrous alloys of chromium and nickel, really stainless steels have been developed. Although a large number have been developed, chromium steels may be roughly divided into three groups. Steels of the first group (up to 5 per cent chromium) are suitable where the excellent combination of strength, toughness and hardness makes them desirable. Some of the steels in this group (particularly those nearer 5 per cent chromium and a low-carbon content) show an improved resistance to corrosion. The second group (up to 20 per cent chromium, and usually containing nickel, as 18 chromium—8 nickel) consists largely of those commonly known as "stainless" or "rustless" steels, distinguished by their great resistance to corrosion. The third group (over 20 per cent chromium and usually with nearly as much nickel) is distinguished by high strength and oxidation resistance at high temperatures.

Stainless steels are used for increased utility and lasting beauty, as in the Empire State and Chrysler Buildings, New York; the LaSalle-Wacker Building and Southtown Theatre, Chicago; and the Warner Brothers Theatre Building, Nashville. Here are just a few other applications: Air-conditioning equipment, blowers, booths, ceilings, chairs, coping, cornices, display cases and frames, doors, down spouts, drinking fountains, entrances, etched panels facades and fronts, foyers, gates, grilles, gutters, hardware, letters and numerals, lighting fixtures, louvres, marquees, mirrors, molding, ornamental work, panels, partitions, pillars, plaques, plumbing fixtures, posts, railings, risers, roofing, scroll work, sheathing, shelving, signs, skylights, soffits, spandrels, structural members, tables, urns, ventilators and ducts, windows. New applications are being constantly found.

In the development of corrosion-resistant metals, advances have been made in broadening the field of materials to be used in exposed places and still look attractive.

As a corollary to corrosion resistance, it might be well to point out the longer life of iron and steel products in general in those locations where the climate is relatively dry.

Methods of treating the surface of iron and steel to prevent corrosion and to improve the adherence and quality of non-metallic coatings point to improvements in steel strictly for decoration.

The trend to stainless steel is favored by developments in surfacing base metals or stainless-clad building materials and by lower prices. More attention will be

THE TRIM ON THE MARQUEE of the Rialto Theatre, Champaign, Illinois, is of the Republic Steel Corporation's famed Enduro 18-8 stainless steel. Republic's Galvannealed was used for the frame and base of the marquee. Stainless steel—and the other ferrous metals and alloys—possess many qualities which will make them increasingly useful in the construction and decoration of the theatres of tomorrow to be built in all locations.

given to modifying appearance by coloration, as well as by using a satin or matte finish.

LEAD

Lead is extensively used as the pure metal or as hard (antimonial) lead, in addition to its use as a coating over copper. The properties upon which its use largely depend are softness, flexibility, ease of forming, inexpensiveness, inertness toward many corroding agencies, and the soft gray patina it secures on weathering. Disadvantages are its heaviness and lack of strength.

Although it must be supported properly, lead has been used as roofing material for centuries and is well adapted to this service from the standpoint of permanence and appearance. The ease of forming makes lead suitable not only for excluding moisture from buildings at joints of roof sections, walls, windows, chimneys, and the like, even when the joints are quite complicated, but for stamping or otherwise forming into spandrels, molding, cresting and other forms. It is also adapted for use in flashing, to cap masonry joints and chimneys, to line gutters and to make leaders, leader heads, and other rain-water-conducting items.

Up to 7½ per cent antimony is usually added to give greater stiffness and permit the use of lighter gauges. This antimonial lead is as resistant to weathering as is pure lead. Alloys of cadmium and tin or of cadmium and antimony offer some promise of permitting lighter-weight sheets to be used by improving the mechanical properties of lead. Addition of tellurium has been an aid for some uses, where greater corrosion resistance is needed, but it is of little importance from an architectural standpoint.

Decorative statuary can be made of hard lead by casting, as well as forming the sheet. Hollow forms are sometimes cast flat, then fashioned into the desired shapes. By lead "burning" or fusion along seams, lead sections are readily joined. Extruded forms are also available for trim. Die-cast lead alloys (containing tin and antimony, as in type metals) can be made with ornamental shape.

Still used, but one of the oldest architectural applications of lead has been the glazing of windows, where lead strip and solder are used to hold the individual glass sections in place. The same construction can be used for windows of clear or colored glass in any building. Another decorative use of lead is in forming grille or filigree work by cutting designs from sheet lead and mounting between two sheets of glass. Mounting may be used against other backings where a window effect is not required.

During the war, the lead situation was unique. Because the metal was not a critical one, miners had a hard time being deferred and as a result the lead situation became critical with a shortage developing, despite plenty of lead in the ground. Wartime demand is changing to the demand for easily-produced solder die castings for various uses, as well as for red lead and litharge for battery plates, pigments, and paints, and for tetraethyl lead for the higher octane gasolines. While marked advances have been made in lead coatings for steel, these products are not likely to replace galvanized items. With continued improvements, however, lead-coated products can be expected to be used in ever-increasing amounts.

NICKEL

As pure metal, nickel is used only to a limited extent (as castings or electroplated surfaces), but its alloys form an important group of material for decoration. The resistance to weathering of nickel and the high nickel-copper alloys is better than that of copper, brass, and silver, but they will tarnish in exterior use.

LEAD MASK, beaten from sheet lead, demonstrates the highly workable qualities of the metal as an artistic medium. The metal, according to the Lead Industries Association, has many uses in theatres.

Inconel

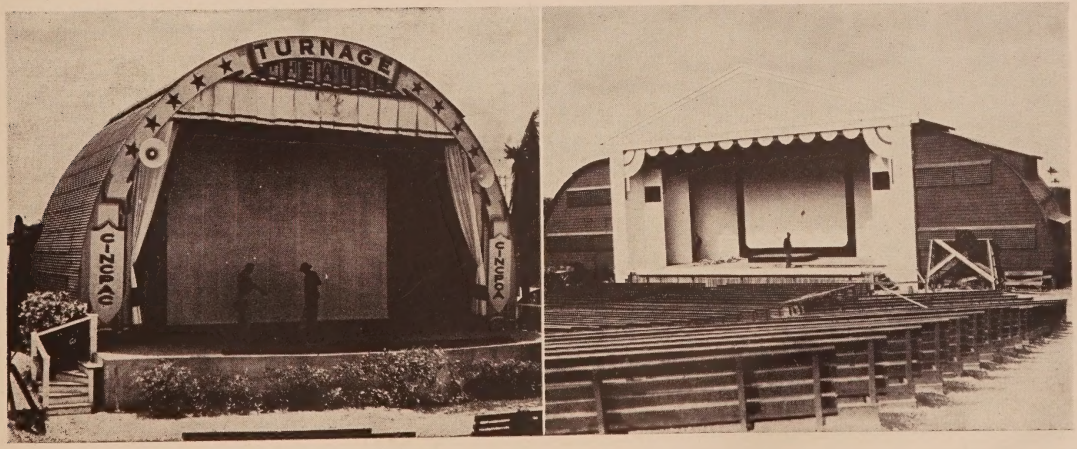
Inconel (at least 75 per cent nickel) combines good working properties with high mechanical properties and corrosion resistance. It is an attractive white metal which is adapted to many decorative architectural forms, but, like nickel, its use is limited because it is relatively expensive.

Monel

Monel, a high nickel-copper alloy (60 to 70 per cent nickel) is less expensive and more widely used. It is strong as structural steel, yet ductile enough to permit fabrication by rolling, bending, drawing, casting, or forging.

The largest use of Monel is in interior equipment and decorations. However, a

YANKEE INGENUITY of the Seabees stationed on Guam may have started a new idea in theatres, judging from these United States Navy photographs. At the left is seen a section of a Quonset used as protection from a screen, and, at the right, longitudinal halves of a 40-by-100-foot Quonset have been applied to a stage to provide for 20-foot wide dressing rooms, along with property rooms, library, offices, and recreation facilities. The Quonset is a development of the Stran-Steel Division of the Great Lakes Steel Corporation, which furnished these pictures. The company is non-committal on Quonsets as pre-fabricated theatres.



number of exterior uses show its resistance to weathering. The roof of the Pennsylvania Station, New York, is an example. Ventilators, skylights, and expansion joints are made of Monel and used without protective coatings.

Of a more obviously decorative nature are the applications of Monel to doors, grilles, lighting fixtures, and the like. Where relatively dry conditions obtain, weathering may give only a translucent film in place of a distinct patina. The original surface can be retained by regular cleaning. Monel can also be given an adherent, durable, basic-oxide coating by heat, as in forging. Two-tone effects are easily obtained by burnishing an uneven or hammered surface so oxidized. Intricate, beautiful forgings and castings—as rosettes, plaques, and moldings—are made. Monel may be etched and engraved.

THE STANDING SEAM ROOF, shown in this photograph provided by the International Nickel Company, Inc., is being installed on Wing D of New York's Metropolitan Museum of Art. Monel metal is the material being laid down. Compare this type of roof with that shown elsewhere on this page. The properties of Monel, an approximate 65-35 nickel-copper alloy, make it valuable for any interior as well as exterior applications.

TIN

Tin is used to coat sheet steel in making tin plate and with lead to form terne plate. Terne is much used in some localities as roofing material, and it gives the appearance of sheet lead. These sheets may be readily joined by soldering, as well as by usual seaming means. Since corrosion resistance depends entirely on the coating, any imperfection or local mechanical injury leaves a spot exposing the steel, which corrodes rapidly.

Pewter, etc.

Solid tin and tin-rich alloys, such as pewter, are comparatively costly and are rarely used for decoration; even tinned steel, copper, or brass have very limited applications. The tin coating resists atmospheric corrosion and is an attractive silvery metal, but as it does not galvanically protect the base metal, any pin-hole or mechanical injury destroys its usefulness as a coating, since rust or copper stain shows strikingly on such surfaces. A process for white-bronze plating and one for tin-coating wide, copper-foil strip may eventually be used in decorative work.

Corronizing

The Corronizing process, developed by the Standard Steel Spring Company, consists of electro-plating metals or alloys with a thin layer of nickel and of zinc, then subjecting the coated metal to high temperatures. The two electrodeposited metals diffuse together to form a coating which possesses unusual properties of resistance to corrosion. Treated metals have a semi-lustrous, gun-metal color, a non-flouring surface suitable for paint and other finishes. Among the products lending themselves to the process are ash cans, hot-water boilers, refrigeration parts and equipment, air-conditioning equipment, oil tanks, flashlight parts, roofing, stokers, heaters, gutters, spouting, thermostats, electrical equipment parts, and hardware.

ZINC

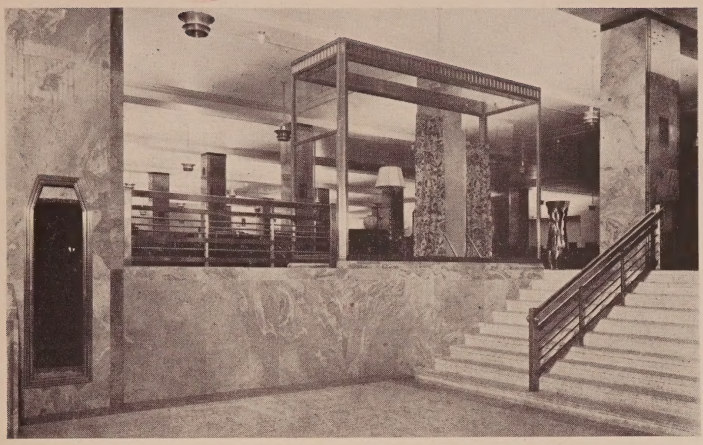
By far the largest use of zinc in architectural work is as a coating on steel for galvanizing. Considerable sheet zinc is used in roofing, however, particularly on the continent of Europe. Continuous zinc strip is used to eliminate cross joints. Zinc finds its way into many fabricated articles and probably can always be found in some place or other in the construction field in the form of die castings, zinc coatings, and brass. Sheet zinc is also used for sheathing parapets, chimneys, and for conduction of rain water from roofs. It is relatively inexpensive, is not difficult to form or handle, and corrodes very slowly. Since phenol in coal tar is said seriously to corrode zinc, it is advisable to avoid contact between tar and the metal.

Zinc-base die castings, plated with chromium or other protective coatings, are used only to a limited extent for decorative door and window hardware. Decorative steel railings, fences, scroll work, and the like are sometimes protected from corrosion by hot-dip galvanizing, with or without subsequent painting.

Galvanized Steel

The importance of galvanized steel in modern construction and as a basis for decorative paints is too great to ignore. Galvanized-steel sheets are the cheapest material of metal construction which will really withstand exterior weather for many years. If further protected by painting at intervals, this period may be extended almost indefinitely. Of particular importance has been the treatment to permit painting the galvanized surface immediately after it has been erected. This is usually accomplished by dipping the sheets into a phosphoric-acid-base solution, whereby the smooth zinc spangles

THE STANDING LOCK-SEAMED ROOF of the Brooklyn Museum's north wing has a large ridge cap made of 0.021-inch Monel, soft-soldered flat longitudinal seams. Masonry on the end is capped with Monel. Also shown in this International Nickel Company, Inc., photograph are Monel expansion joints, Monel gutters, and Monel ventilators. The head of the hanging staircase is also sheathed in Monel. (The skylight is of corrugated glass.)



THE DEPRESSED ELEVATOR ARCADE, showing stairs to the main floor, is in the T. Eaton Store, Toronto. Note the use in windows, showcases, and railings of Monel metal, product of the International Nickel Company, Inc., and provided in this instance through the Canadian associate, the Architectural Bronze and Iron Works, Ltd. Such uses of Monel suggest possibilities of the alloy in theatres, for railings, display frames, and the like.

are roughened sufficiently to permit the paint to adhere.

Zinc has the big advantage of low cost as a protective coating on steel. Such surfaces will continue to be used. It is probable that means will be found to prevent gray coating characteristic of weathering. The zinc die-casting field should remain active. Zinc compounds will find continued use in paints.

There should be a large post-war demand immediately for galvanized products, especially for replacement purposes. Some competition is expected from aluminum coated steel.

MISCELLANEOUS METALS

Cadmium

Cadmium is infrequently used except in electroplating. Alloys of cadmium and tin and of cadmium and antimony are more commonly used in Great Britain than in this country.

Chromium

Chromium metal is used in alloys for electrical resistors, corrosion-resistant alloys for many purposes, chromium bronzes of high tensile strength, and in special tools and equipment.

Chromium may enjoy peacetime use in electroplating.

Gold

Gold leaf, one of the oldest of the decorative materials used in architectural work, still has its place in modern decoration. For exterior work, 24-carat gold is used. Although most foils are made by carefully rolling the metal between highly polished rolls with special lubricant coatings, gold foil is still made by hand by reduction with a hammer. Mechanization has come slowly in the manufacture of gold leaf.

Magnesium

Magnesium is not used for exterior decoration, but rapid development of magnesium alloys and its low cost on a volume basis are favorable toward future uses. There is an abundance of producing capacity available.

Palladium

Palladium leaf is also available where a white, metal finish is desired. It may be bright or matte finished.

Silver

Silver is not used on exteriors, due to the rapidity of tarnishing in sulphur-containing atmospheres, and interior use is restricted for the same reason.

THE RARE METALS

During the last 15 or 20 years, great strides have been made in the commercial development and utilization of the so-called minor metals, many of which have been heretofore classed as museum "curiosities." This development has gone hand in hand with developments in other fields, notably vacuum technology, comprising the manufacture of electric lamps, radio tubes, photo-electric cells, mercury arc rectifiers and other glass-enclosed apparatus and devices. Next to these demands have been those of the building and transportation industries for metals and alloys which are stronger and lighter, more resistant to fatigue and to corrosion, cheaper and better than any metals and alloys ever produced in the past.

To appreciate the radical changes that have come about, we might recall that, less than a generation ago, airplanes were constructed largely of wood, and not long ago stone was considered an essential element in building construction!

Electro-chemistry has contributed fundamentally in meeting the most exacting demands of various Twentieth Century industries. With the aid of modern, scientific apparatus, it has been possible to evolve products heretofore not possible by non-electrical methods.

Generally applicable in these developments has been the observation that, as soon as the demand for raw materials from which certain rare metals are derived becomes sufficiently insistent, chemists, geologists, miners, prospectors, and explorers from all over the world respond, and, often sooner than expected, locate deposits of commercial importance

To recount in detail the many developments in the field of rare metals that have contributed so largely to present-day enterprises—such as cinematography or television—would lead far beyond the scope and purpose of this article. Accordingly, only a few typical cases will be discussed.

ARCHITECTURAL DECORATION, protected from the elements by galvanizing, has wide possibilities, as represented by this ornamental railing surmounting the old California House. According to the American Hot Dip Galvanizers Association, which furnished the picture, this railing was installed in 1914. Hot dipping is the process of galvanizing by submerging the article in a bath of molten zinc to form a thick, uniform deposit.

ALL THE PURE URANIUM which was available to scientists at the start of the nuclear fission (atomic energy) project was made in this laboratory set-up of Dr. Harvey C. Rentschler at the Westinghouse Electric Corporation's Lamp Division, Bloomfild, New Jersey. W. C. Lilliendahl, research engineer at the division, places a small cube of pressed uranium into a crucible at the bottom of the coil for induction heating in the big bottle.

Lithium

Lithium, the lightest of the metals, is relatively abundant, but corrodes too easily for use other than as small additions to other metals. It makes a good scavenger and deoxidizer, hence is used in making some castings of many metals and alloys. The introduction of but 0.1 per cent lithium imparts physical properties to Scleron (an aluminum-zinc alloy) which approach those of steel. Lithium salts are often used in air-conditioning equipment.

Potassium

Only a small fraction of the supply of potash salts (the greatest portion going into the fertilizer trade) is converted into metallic potassium. Following the pioneer experiments, elaborate investigations have been undertaken to perfect the potassium photo-electric cell. Although this cell is not as sensitive as either the rubidium or cesium photo-electric cell, particularly in the red end of the spectrum, the potassium cell is, nevertheless, relatively cheap and has found many applications outside of the cinematographic and television industries.

Rubidium and Cesium

Rubidium and cesium, so very active chemically that they are not produced until the moment they are needed, are used in photo-electric cells. In fact, without these metals, the talkies and television would not be advanced as far as they are today.

The Magnesium Group

Aside from the large scale industrial development of magnesium and its alloys —such as Dowmetal—in industry, very important applications of all the metals of the magnesium group (including also calcium, strontium and barium) are based on their characteristic "getter" or scavenger properties.

Calcium, a pioneer in this field and seriously competing with magnesium, (the ideal scavenger for nickel) was one of the earliest getters for radio tubes. Today calcium is used on a very large scale as a scavenger for the removal of impurities from molten ferrous and non-ferrous metals; it is also used for the removal of bismuth from molten lead.

One of the common getters used in vacuum-tube work is an alloy of 20 parts of barium, 20 of strontium, and 60 of magnesium. A small pellet of this, or similar, alloy is placed in the radio tube and, after exhaustion and sealing off, the alloy is volatilized with the aid of a high-frequency coil placed over the tube. A goodly percentage of the residual gases is converted into solid alkali-earth metal compounds and the gas remaining does not interfere with good tube performance.

Of very special interest are the thermionic properties of barium. Barium is the very "heart" of the automatic telephone service, where a barium-oxide coated filament is used. The same filament has contributed very largely to the success of the modern sodium and mercury-vapor lamps.

Beryllium

The rapid growth of the industrial applications of the 2½ per cent beryllium-copper alloy has been most phenomenal. It is the first metal that has been able to compete with spring steel. Copper-beryllium not only has a fatigue resistance about equal to that of steel but it is highly resistant to corrosion and is a fair conductor of electricity. The copper-beryllium alloy is manufactured into a wide variety of articles: knives, hammers, chisels (that will cut low-carbon steel), coiled and flat springs, and many types of wire and strip parts for devices subject to repeated flextures.

Gallium

When used in radio tubes, gallium emits electrons readily. It does not oxidize readily, and, on account of its high boiling point, it does not volatilize appreciably even at red heat.

Indium

Indium has, since 1932, been available in commercial quantities in excess of the demand. It has found a wartime use as a coating on silver lined bearings for aircraft, and is becoming well known in electroplating. Indium is one of the very softest of metals that will withstand atmospheric corrosion.

Thallium

Thallium, occurring in zinc and lead ores, enters the market chiefly as salts used for the extermination of rodents.

Scandium, and others

Little research has been done on the three rare metals—scandium, yttrium and lanthanum—grouped with gallium, indium, and thallium. Although lanthanum is used to a small extent as ferro-lanthanum, serving as the "flint" in place of ferro-cerium in certain types of cigarette lighters, little has been accomplished in finding a well-defined field of general application for these three metals.

Germanium

Germanium, like gallium and indium, is a by-product of the zinc industry. It forms a remarkably low melting alloy with gold, and its high electrical resist-

ance may make it commercially useful in constructing compact resistors.

Zirconium

To see dozens of spools with thousands of yards of zirconium wire and to see beautiful sheets of zirconium metal emphasizes the recent remarkable progress made in the metallurgy of this rare element. Zirconium is very resistant to chemical attack, hydrofluoric acid (the one that etches glass) being the only one to dissolve the metal rapidly.

Columbium

Within the space of five years, columbium has passed from the rating as a very rare and precious metal to one of everyday industrial application. In the study of the intergranular corrosion of stainless steels—notably the 18-8 variety—it was found that the addition of small amounts of columbium effectively counteracted this corrosion.

Tantalum

Tantalum, as metal, is now used extensively for its outstanding chemical and physical properties. It is highly resistant to corrosion; it can be hammered, drawn, and welded. Stills and kettles are lined with tantalum sheet. It is used in making spinnerettes for rayon; grids and plates for radio tubes; and chlorine-resistant needle valves. Seamless tantalum tubing is available in a wide range of sizes, down to the smaller-bore tubing used in hypodermic needles. Tantalum carbide is very hard and competes with tungsten carbide in making machining tools.

Bismuth

The lead industries of America have, during recent years, been promoting new fields of application for bismuth. It is now used in low-fusing alloys for a wide variety of purposes, and in special low-melting solders.

Molybdenum

Molybdenum, widely used both as metal and in steel alloys, should no longer be classed as a rare metal. Thin-walled, high-strength, chromium-molybdenum steel tubing has made modern high-speed airplanes possible. Added to steel, molybdenum improves its toughness and fatigue resistance. Added to cast iron, it eliminates porosity and increases the high temperature strength. Molybdenum metal, as such, is used extensively for parts of radio tubes.

Tungsten

Tungsten is no longer considered a rare metal. Its steel alloys are used for magnets and high-speed cutting tools and, as a metal, it is widely employed for the filament in electric light bulbs.

Uranium

Uranium metal is malleable and ductile. Large quantities of uranium mineral are available as a forced by-product of the radium industry. In spite of several distinctive properties of uranium metal—one of which has come to public notice in connection with the atomic-energy bomb—little commercial use has so far been found.

Serenium and Tellurium

Selenium and tellurium are both derived from by-products of electrolytic copper refineries. A few years ago both metalloids were largely discarded and wasted, but today they are carefully recovered.

The outstanding development with selenium is its application in the new photo-electric cells. These cells are not based on the old principle of a change in resistance with a change in illumination, but on the electronic emissivity of this film of selenium when exposed to light.

Small percentages of selenium added to stainless steels make them free-machining. Similar effects on steel are obtained upon addition of tellurium. Added to lead in small percentages, tellurium makes lead more resistant to corrosion.

Tellurium has become an important reagent in the purification of electrolytic zinc solutions, to assure a more complete removal of objectionable traces of cobalt. Of interest, too, is the use of tellurium vapor in certain tube lamps.

Cobalt

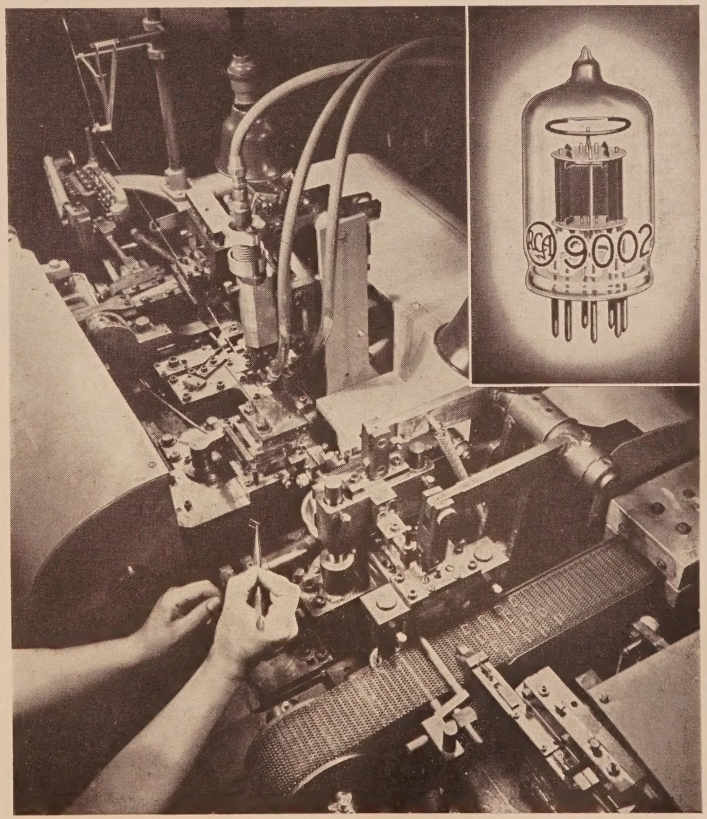
Cobalt is rare when compared with iron and nickel. However, cobalt is a metal of very wide commercial application. Many tons of the alloy stellite (chromium, tungsten, and cobalt), one of the best alloys for cutting tools ever developed, are made. Another recent development is the aluminum-nickel-cobalt-iron alloy commonly called Alnico. Cobalt is the best cement for tungsten carbide.

Very little nickel as such is plated in America today. The so-called "bright nickel" deposits are usually an alloy deposit of nickel and cobalt. A deposit composed of one part cobalt and two of nickel is the whitest deposit known, even silver due to an unavoidable tarnish film looking yellowish in comparison.

Rhodium

Rhodium is the most interesting from an electrochemical point of view. The metal has a high reflectivity, is relatively hard, and is very resistant to corrosion. Rhodium-plated nowadays are millions of articles, including intricately designed silver jewelry and large three-foot reflectors used in air beacons and smaller ones used in motion-picture projectors.

THE HIGH VACUUM NECESSARY for modern electronic tubes has been possible only through "getters," substances which remove what is left of the air after the pumps have removed all they can. These Radio Corporation of America photographs show the machine which turns out the getter mounts and boats and a tube with the device in place. The getter is placed in the boat and volatilized through high-frequency currents.



Copper, Brass, and Bronze and the Theatre

Lifting of Wartime Restrictions Opens Way To Wider Uses of Copper and Its Alloys

By BERTRAM B. CADDLE

Secretary of the Copper and Brass Research Association

With all restrictions lifted on building materials by the government thousands of new theatres will be constructed throughout the United States during the next two years. Several other thousand will be rehabilitated through "face lifting" of outmoded exteriors, while interiors will be refurnished with resplendent fixtures and a majority will be air conditioned.

Since Pearl Harbor, there have been very few new theatres constructed and comparatively little remodeling, due to the freezing of critical metals, particularly copper, brass, and bronze, by the government. But now, from Broadway to Hollywood, to the main street of even the most remote hamlet, the sound of hammer and saw in the construction and remodeling of theatres will soon be heard.

During the winter months there will be great activity in the Southland, while in the northern part of the country work will be rushed in remodeling interiors. By spring of next year, this long awaited building boom for both the construction of new theatres and the remodeling of building structures will be under way, and the largest amount of money spent in this field over a two-year period will be expended.

The construction of new theatres, both for the production of plays and the showing of motion pictures, will not be towards modernistic structures, in my opinion, with the exception of a few structures of this type in smaller towns, and this is made after a careful nationwide survey. The majority of new theatres in metropolitan cities will be housed on the first floor of superior structures, such as office buildings, hotels and other types of commercial buildings. In the small towns of say 25,000 and less, there will be a large number of theatres constructed as theatres only.

In the vernacular of the theatre, showmanship must be displayed in the construction and remodeling of theatres to make them attractive, if the operation of the theatre is to be successful. In other words, the theatre management must appeal to the comforts of his patrons through exquisite interior decoration, air conditioning in summer, and plenty of heat in winter, just as much as in booking first run or other screen entertainments which will please their patrons.

Non-ferrous metals will play an important part in the construction of new theatres and in the renovation of present structures. In this connection, copper and its alloys—man's oldest and most useful metals—will play an important part just as they have in the theatrical fields through the flight of centuries.

While there is only one Radio City Music Hall in all the world, we might cite this as a striking example of the importance of theatre management, having as its slogan, "Comfort for its patrons and good attractions." This show place of the nation was constructed with metals that have proven their service and durability over the centuries. That is why there is more copper, brass, and bronze here than in any other theatre in all the world.

The beautiful medallions on the exterior of the Radio City Music Hall are enameled on a base of rust-proof brass. The entrances are of solid brass, because the metal work on the exterior of the structure is exposed to the elements—snow, sleet, rain, fog and the sun—which rusts ferrous metal.

When one enters the Music Hall, the railings and doors are brass. In the Grand Foyer, behold a fairyland, because all the doors, balustrades, hardware fixtures, and decorative trim are solid brass and bronze, which under the myriad of lights sparkle like the stars.

RADIO CITY MUSIC HALL, in New York — probably the world's most famous cinema—is definitely the most lavish utilizer of copper and its alloys. From great brass medallions used in exterior decoration, the doors and railings of brass, the copper-leaf ceiling of the grand lounge, balustrades and trim of brass and bronze, to wiring and electric equipment, no other theatre has more! With the return of copper, brass, and bronze to civilian utilization, it is expected they will assume greater roles in theatres. (Photographs through the courtesy of the Radio City Music Hall and the Copper and Brass Research Association are used here.

Lead, a Metal of Many Uses in the Theatre

Utilitarian and Decorative Applications Combine to Increase the Demand for Lead

By J. Leland Benson
Lead Industries Association

. . . but thou, thou meagre lead
Which rather threat'nest than dost promise aught,
Thy paleness moves me more than eloquence . . .

SHAKESPEARE:
"The Merchant of Venice"

Bassanio, in common with millions of others who are only superficially acquainted with the properties and qualities of lead, regarded it as a metal meagerly endowed with valuable attributes. But he, like many others, found upon closer acquaintance that lead's paleness exists only on the surface and that it conceals a rich reward for him who would choose to seek for unseen values.

Lead probably has more fields of application in a theatre than any other single metal. In an average theatre, built and furnished with no special thought given to the use of lead, this metal will be found in many places throughout the structure. With a little imagination and thought, lead can be made to serve many less common purposes with efficiency and economy.

UTILITARIAN APPLICATIONS

Plumbing

One of the most important functions of lead is, of course, as a plumbing material. The theatre must provide for its patrons that much abused but necessary facility, a public toilet. Liberal use of lead in the waste-disposal pipes of a public toilet can do much to minimize maintenance costs and insure against costly and disagreeable repair jobs. Properly installed, soil and waste lines of lead will provide smoother outlet and less turbulent flow for waste water than will any other type of piping, with consequent reduction of noise and less likelihood of stoppages. Lead pipe is almost totally unaffected by the acids and acid fumes which are always present in plumbing waste and vent lines to which other metals sometimes used for these purposes are highly vulnerable.

One very important advantage of lead plumbing fixture connections which is often overlooked is flexibility. The fireproof construction required for safety of the theatre's occupants is of necessity rigid. Also the primary frame of the main waste lines, being probably of cast iron, is rigid. However, both the building structure and the pipe frame are subject to thermal expansion and other movements within themselves and at different rates. Without the flexibility provided by lead connections between the rigid pipes and the fixtures which must be secured to the building structure, excessive strains may be imposed upon the ceramic bodies of these fixtures to cause breakage. Such breakage is not uncommon in rigidly connected systems and the cause is in many cases not recognized. Only by means of flexible connections such as those provided by lead can such breakage certainly be avoided.

Water-Proofing

In connection with plumbing, another important function which is best performed by lead is the water-proofing of floors of toilet rooms and other areas—such as air-conditioning machinery rooms—where water is used in operating equipment. Such areas, when located in upper parts of the building, are often directly over vestibules or other expensively decorated sections which would be severely damaged by overflows or breakage. A sheet lead pan under the entire floor of rooms containing such hazards is an excellent insurance against costly redecorating jobs should water leakage occur.

Roofing

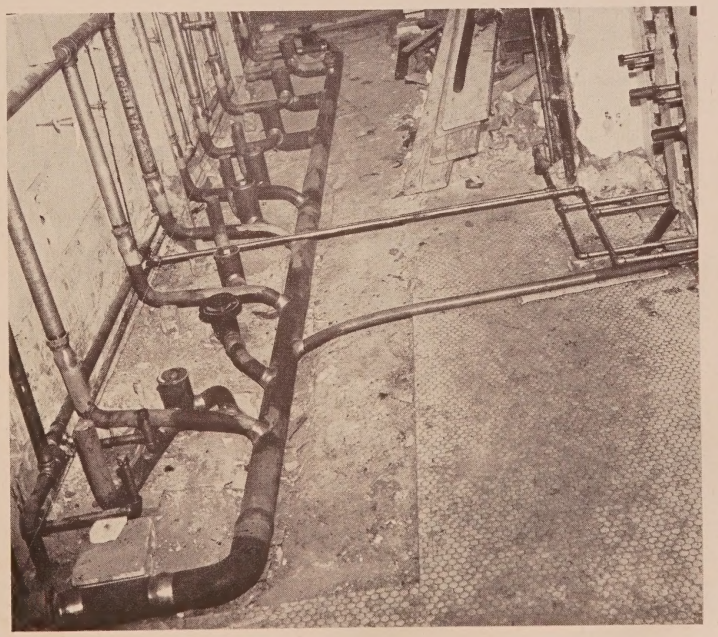
Water leakage is no less damaging to interior decorations when it comes from the roof.

The usual metallic roofing materials as well as plumbing pipes are subject to corrosive elements. The air, particularly in cities, is laden with acid vapors, the products of industrial and other heating equipment. Lead is well known to be more resistant to such corrosive agents than any other roofing metal.

Sheet lead has for centuries been recognized as a high quality roofing material and modern practice using hard lead, an alloy of lead, has removed lead from the category of high-priced materials by making possible the use of thinner sheets. Where the design of the theatre building includes an exposed roof as a part of the facade, the soft light gray of a lead roof can be a delightfully attractive feature.

In those strictly utilitarian functions of flashings, copings, and incidental water-proofings, lead's unrivaled permanence provides security from damage by corrosion.

IN THE FIELD OF PLUMBING, lead finds one of its most important uses. The employment of lead for soil and waste pipes, properly installed, can be of inestimable service in keeping down maintenance costs and preventing expensive and disagreeable repair jobs. Here are seen lead plumbing fixture connections in a public toilet installation, to provide flexibility as well as dependable sanitation. (Lead Industries Association photo.)



Sound Control

Lead is an effective material for use in the control of sound. In the construction of sound-proof radio control rooms, which are sometimes part of a modern theatre's equipment, lead may be used as an absorbing material in the walls and doors. Broadcasting studios often rest entire rooms on pads of lead as well as line the walls and ceilings with sheet lead. Lead-lined sound-proof doors are stock items of door manufacturers.

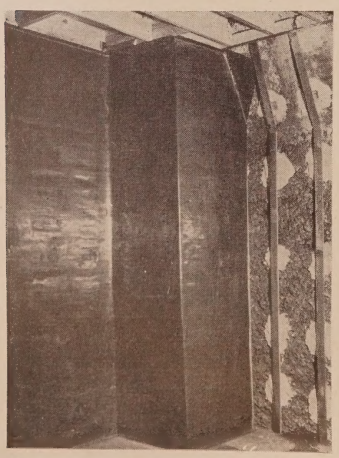
More common problems of sound and noise control include the damping of machinery vibrations. A very successful vibration isolation pad for use under machinery such as refrigeration compressors consists of a sheet lead envelope enclosing two sheets of asbestos millboard separated by a thin sheet of steel. Pads of this type will stand very heavy loads and will sharply reduce the amount of vibration transmitted to the building.

The very property of lead that makes it suitable for suppressing unwanted noises makes it ideal for use in producing desirable sounds. Because lead does not respond to vibration, it is the best metal for use in organ pipes. Many of the speaking pipes of an organ are made of lead alloy which, being non-vibrating, does not respond to the sound vibration produced by the mouth of the pipe or the reed, as the case may be. This is very important because each range of pipes is voiced to produce a certain combination of tones and overtones and the production of a single additional vibration would alter the characteristics of the voice.

Hardware

Probably no other type of building requires more fastenings for securing furniture and equipment in place than does a theatre. The seating alone calls for thousands of bolts to be securely set in concrete floors. Projection machines and their auxiliaries, ventilating equipment, exit lights and many other special features must be made fast to walls and floors. For this purpose there is no more adaptable or more economical fastening than the lead cinch bolt or lead calked anchor bolt. There are many types of bolts of this character on the market, many of them of patented design sold under trade names. However, they all operate on the same general principle of expanding a soft lead ring over a tapered bolt head or nut, either by screw pressure or calking. The smaller type most often used for fastening seating to the floor, consists of a bolt with a tapered head assembled complete with a soft lead sleeve. To provide a firm anchor it is necessary only to insert the assembly into a properly sized hole drilled in concrete or stone and strike a few blows on a tubular calking tool slipped over the threaded end of the bolt.

LEAD, AS A SOUND-PROOFING MATERIAL, has developed tremendously since the advent of modern radio studios. Because lead does not vibrate, as do other metals, it is a most efficient sound deadener.



FOR THE CAMES IN STAINED GLASS WINDOWS, lead realizes its classic use in decoration. Whereas in the older decorations of this type, lead merely held the units together, modern craftsmen, as is shown in this Lead Industries Association photograph, use lead as an integral part of the design. This door panel, with the central medallion surface modeled, was designed and fabricated by D'Ascenzo Studios of Philadelphia.

Cement

Another lead product which is often used for fastening two materials together is a cement made of litharge (an oxide of lead) and glycerine. This cement is not used as a glue but rather as a grout, for instance where a metal part is to be fastened into a hole drilled in marble or where glass is to be set in a metal channel. This cement must be used soon after being mixed and it will quickly harden to produce a hard water-proof joint.

Battery Plates

One more utilitarian use should be mentioned, and that is storage batteries, which are often provided as a means of emergency lighting in case of power failure. Such lighting might be the means of saving hundreds of lives by averting panic in case of interruption of electric service.

DECORATIVE APPLICATIONS

So far, we have considered only the purely utilitarian uses of lead in its applications to the theatre and, while that list is not complete, some space must be saved for the decorative and ornamental uses.

Red Lead Paint

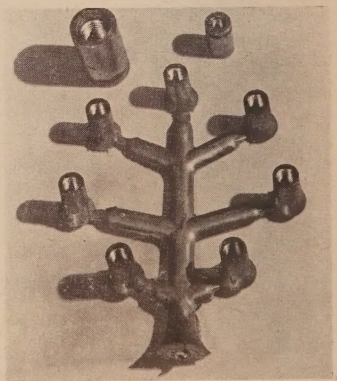
The most common decorative use of lead, and one which is also highly utilitarian, is in paints. Of course, red lead, although almost certain to be present as a priming and rust inhibiting paint on structural steel and ornamental iron, is seldom seen, but white-lead paint is an indispensable material for use on new construction, as well as in the maintenance of theatres.

White Lead Paint

Pure white-lead paint provides long-lasting protection for exterior wood and metal work, but it is on interior walls and trim where white-lead paint performs its most outstanding service in theatre maintenance. This service begins with the application of the paint. Pure white-lead paint is easy working, which facilitates and speeds up the work of the painter. In addition, pure white-lead paint is an ideal base for mixing the most delicate selection of colors for use in any decorative scheme.

Also, the maintenance of a carefully worked-out color scheme executed in pure

LEAD CINCH BOLTS, sometimes called anchor bolts, are important in effecting tight fastenings to concrete. In this picture, from the Lead Industries Association, are seen the lead sleeves assembled with cone nuts.



THE USE OF SHEET LEAD FOR ROOFS is centuries old, but only with the development of hard lead (an alloy), permitting thinner sheets, were such roofs removed from the most expensive category. Lead roofs are long lasting and are pleasing in color and texture, as shown in this Lead Industries Association photograph. Lead may also be employed as flashings and couplings, and for water-proofing, especially in cases of corrosion.

white-lead paint is economical. After long service it can be washed clean and bright with a mild soap solution. Finger marks, dust collections, and the accumulation of dirt around ventilating outlets can be easily removed, thus extending the life of the decorative job with consequent savings of money and shut-down time.

Painted walls need not be flat plain colors, although effective decorating schemes can be created by using contrasting colors on adjacent walls or by means of stripes or other variations. A very useful device, especially in smaller areas such as lounges or corridors, is the all over stencil. It is especially valuable where it is desired to give an otherwise bare room a furnished appearance with a minimum amount of actual furniture. Executed in white-lead paint, the all-over stencil design can have all of the decorative value of wallpaper plus the washability that makes white-lead painted interiors so economical in maintenance..

Mural Cement

White lead is also used as a cementing material for the application of mural paintings to plaster walls. Fine paintings of this type are usually done on canvas in the studio and applied to the walls with a cement made of paste white lead and varnish. Paintings so applied are not only firmly attached to the wall but are protected from any chemical action which might otherwise occur between the plaster and the colors in the painting.

Leaded Glass

The purely decorative uses of metallic lead are limited only by the imagination of the designers and there is much precedent from which to draw. The first thought in this connection will doubtless be of leaded glass windows, in which the use of lead cames can be expanded to include silhouettes and outlines of great variety and interest. An unusual and very effective variation of this thought is the enclosing of a decorative pierced sheet of lead between two panes of plate glass to produce the effect of wrought grillwork. In this manner, designs of great intricacy and originality can be executed with comparatively small expense and an installation of this type possess the advantage of being easily cleaned.

Sheet Lead

Attractive lighting fixtures are an asset to a theatre both in the lobby and in the auditorium, and lead offers interesting possibilities in this field. Leaded glass or silhouettes of lead applied to glass or a combination of both are interesting applications. Sheet lead silhouettes are easily made. They can be timely or amusing and since they are not difficult to produce they can be changed with the season or they might even be made to fit the theme of the current presentation.

Sheet lead is adaptable and easily worked and can therefore be economically used for the unusual decorative details which give a theatre individuality. Repousse masks, figures, crestings for display boards and other features of lead can be left in the natural color or painted and gilded. Repousse lead panels of subjects associated with the theatre would make an unusually effective soffit for a marquee or a lobby ceiling. Stamped panels of one design alternated with varied hand worked panels would produce a highly individual result with economy.

Miscellaneous Uses

On the stage lead may be used for counterweights where space is limited and some of the curtains will certainly be weighted with lead weights especially made for the purpose. Power cables and sound-equipment cables are often lead sheathed for mechanical protection and electrical shielding.

The poster shop can often use lead effectively in the construction of displays in the form of sheets and strips for stiffening and weighting as well as for silhouettes or cutouts. The property man will sometimes find that a rug or a carpet has a curly corner which can be subdued by sewing or gluing a narrow strip of lead to the under side.

* * *

In fact, about the only place around a theatre where important and helpful uses for lead cannot be found is at the cashier's window. But even the lead nickel is an illustration of the workability of lead and the ease with which it may be shaped into any form.

USE OF LEAD AS A WATER-PROOFING MATERIAL is important in the construction of toilets, air-conditioning machinery rooms, and other places where water is used in operating equipment. This Lead Industries Association photograph shows workmen welding the joints of a lead pan under the floor of a room designed to house water-operated equipment, an excellent insurance against costly repair bills as a result of leakage.

Magnesium, The Newest Structural Material

Light, Rigid, Strong, War-Developed Metal Will Have Many Uses in Post-War Theatres

By L. B. GRANT

Sales Manager, Magnesium Division of the Dow Chemical Company

The theatres of our country express a freedom of imagination on the part of designers which is rarely equalled in other structures, public or private. Constant effort is being exerted to enhance the beauty of theatres and increase the comfort of their patrons. In this effort, a variety of new ideas in the use of established materials has been developed, and rather than resisting the advent of new and unusual materials and ideas, theatre designers, owners, and architects seem to welcome those which will widen the scope of their efforts.

The newest of structural metals, magnesium, is now ready for utilization, and it should prove of interest to anyone who is concerned with designing, constructing, remodeling or equipping theatres. The value of magnesium to the industry can best be determined by the industry itself, once it is aware of the characteristics of the metal. No attempt has previously been made to introduce this material to the theatre industry. Lacking a background of experience in that field, we who know magnesium can only offer the knowledge of the metal we have acquired over the past twenty-five years and suggest possibilities of its usefulness to you.

THE PRESENT INDUSTRY

Magnesium became a common news item at the beginning of the war, when it was spotlighted by the government as one of our most critical materials. New plants were erected for its production in many parts of the country. For some years prior to that time, the Dow Chemical Company had been the only producer of the virgin metal, a few companies were fabricating it, and perhaps a few hundred other companies had found it useful in their products. Total production in 1939 was about 6,000,000 pounds a year. By 1942, production capacity in the United States had reached almost 600,000,000 pounds a year. Several different companies were operating government-owned production plants, and dozens of foundries and fabricating shops were converting the metal into parts for military aircraft and other military equipment.

Technologically, magnesium was ready for this tremendous expansion. Years of research effort had resulted in the development of strong, durable alloys, and efficient methods of casting, extruding, forging, rolling, welding, and finishing the metal. Its use in aircraft had been steadily expanding, and had been extended to purely industrial products, such as portable tools, business machines, and handling equipment. With the advent of the war all civilian uses of the metal were cut off, and the entire fabricating capacity of the country was devoted to furnishing war material. This wartime expansion has had a significant effect on the magnesium industry. Advantage was taken of the opportunity to apply mass production techniques to handling of the metal, its serviceability has been proven under a wide range of service conditions, and thousands of people who were unaware of the metal five years ago have become familiar with its characteristics.

Magnesium is obtained from underground brines, sea water, and several natural ores. The method of extracting it from sea water is one of the most significant advances in the field of chemical engineering in recent years. At a plant on the Gulf Coast in Texas, millions of gallons of sea water are treated daily to obtain magnesium chloride, which is decomposed in electrolytic cells to extract metallic magnesium. To this pure magnesium are added small amounts of alloying metals, such as aluminum, manganese, and zinc, to make commercial alloys. The sea-water process has made magnesium the most available of all structural metals—there are about nine billion recoverable pounds in a cubic mile of ocean water.

MAGNESIUM CHAIR, made from the Dow Chemical Company's Dowmetal, is one of a hundred such which have been in constant use at the Midland Country Club, Midland, Michigan, for over 10 years.

PROPERTIES OF THE METAL

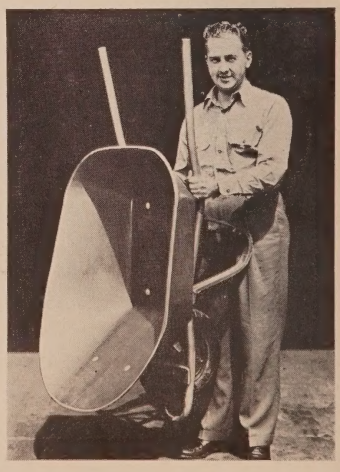
Since the first ingot of magnesium was produced, we have learned how properly to handle the metal so that today efficient techniques of fabrication are established, and further improvements are constantly being made. Magnesium can be furnished in the form of sand or die castings, extrusions, forgings and sheet. It can be cut, formed, welded, riveted and painted. This adaptability to all types of fabrication methods gives the designer choice of a wide range of physical forms.

Lightness

Magnesium's most notable and most important characteristic is its extreme lightness. Iron weighs more than four times as much, and aluminum is 50 per cent heavier. This light weight, plus good strength properties, aroused the interest of aircraft manufacturers more than ten years ago. In anything that moves or is moved, reduction of unproductive weight through the use of magnesium results in easier handling, lower labor costs, increased payloads, or greater operating speeds. In static structures, magnesium can reduce the amount of material usually necessary for support of the structure. Such savings are obtainable without any sacrifice in strength.

There are other ways in which the lightness of magnesium can be used in

EASILY LIFTED is this wheelbarrow, fabricated from the Dow Chemical Company's Dowmetal and weighing only 30 pounds, in contrast to the 85 pounds a steel barrow of the same proportions would weigh.



addition to weight reduction. One of these is simplification of construction. In many cases, a single casting or wrought magnesium part can replace an assembly in another metal without incurring a weight penalty. Labor operations—such as assembling, riveting, or welding—are thus greatly reduced. The floor beam in the Douglas C-47 is an excellent illustration of this principle. Here a single extruded magnesium I-beam is now being used, which is 35 per cent stronger, 25 per cent cheaper, and 5 per cent lighter than the riveted aluminum assembly it replaced.

Rigidity

Another advantage which can be obtained in designing with magnesium is rigidity or stiffness. In sheets of equal weight, for example, magnesium is twice as stiff as aluminum and eighteen times as stiff as steel. Therefore, it is possible by increasing sections a certain amount to secure greater rigidity in magnesium structures and still maintain a weight saving compared to aluminum and steel.

Experimental magnesium airplane wings of pure monocoque construction illustrate the utilization of both rigidity and simplified construction. These wings are no heavier than conventional aluminum wings, yet they are easier to fabricate and have better aerodynamic efficiency. The thickness of sheet used for the skin gives sufficient rigidity to eliminate the necessity for stringers and stiffeners ordinarily riveted to the skin, and at the same time reduces the tendency to "flutter."

Reducing dead weight is an important function, but the lightness of magnesium often permits its use in products where it offers little or no weight reduction yet results in other improvements. This is particularly true when magnesium replaces wood. For example, experimental magesium skis made recently are about the same weight as wood skis. Preliminary tests show that they may be faster and more maneuverable. Many attempts had been made previously to produce skis in other metals but all had been unsuccessful. Sufficient stiffness could not be obtained without incurring too great a weight penalty.

Machinability

Machinability is probably the second best known property of magnesium. It is so easily machined that very high speeds and deep cuts can be used, yet there is no difficulty in obtaining a smooth surface. In iron and steel, the cost of machining is a high percentage of the total cost of the finished part. In many cases a finished magnesium casting may cost less than a similar casting in iron, even though rough cast, the magnesium may cost more than the iron. For example, some iron castings in a paper bottle machine were replaced by magnesium castings, which were about 75 per cent lighter and actually somewhat cheaper due to savings in machining. The lightness of these castings, which were reciprocating parts of the machine, resulted in lower power requirement, and smoother and quieter operation.

The mention of reciprocating parts brings up another interesting property of magnesium—its high damping capacity, or ability to absorb dynamic energy. This means that a magnesium part which is subject to vibration will absorb these vibrations to a very great extent. In machinery where vibration is a problem this property added to the light weight of the metal contributes to reducing noise and wear. The experimental cast magnesium automobile wheels tested in road service have shown that the metal absorbs much of the energy resulting from roughness in the road surface, which in a steel wheel are normally transmitted to the axle and springs.

Other Properties

The thermal properties of magnesium are exceptionally good. The magnesium griddle, used over two burners, has such good heat distribution food will cook at the same rate on all portions of the griddle. Any difference in temperature between the part over the burners and that between the burners is not noticeable. It heats up to cooking temperatures quickly, and the lightness of the metal permits making the griddle thick enough to avoid warping in normal service.

The non-sparking characteristic of magnesium allowed it to replace wood shell loading trays in a small arms ammunition plant. Its use in compasses and gyroscopes is possible because it is non-magnetic.

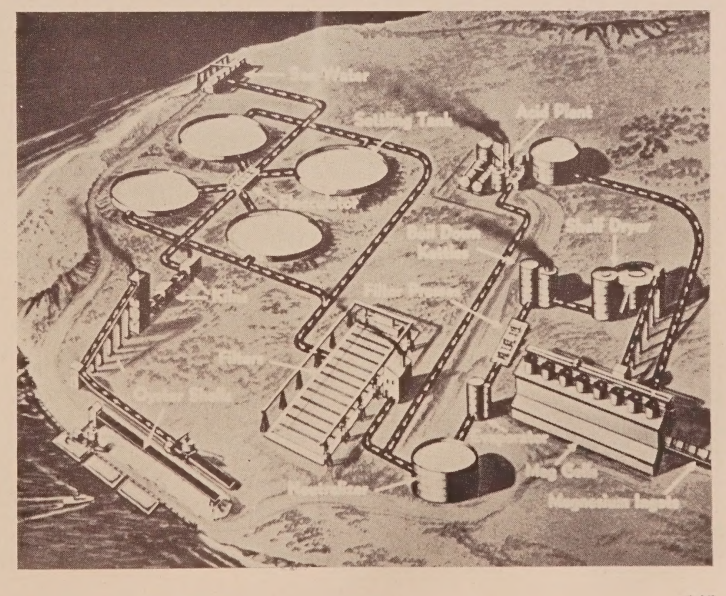
INDUSTRY'S UTILIZATION

Just as light weight is magnesium's best-known property, so aircraft is its best-known field of application. Aircraft was the most obvious field in which to utilize the light weight of magnesium, and this industry was the first to adopt the metal. During the war, all the structural magnesium available went into military planes. Two to four hundred pounds of magnesium castings were used in many aircraft engines, forged hydraulic parts and control links were used throughout the plane, formed and die cast fittings saw service, and probably 95 per cent of all military planes have been equipped with shock-resistant cast magnesium landing wheels. Post-war civil aviation will take advantage of what has been learned during the war about the serviceability of magnesium. Few service failures have been reported, and of these the majority have been due to incorrect design rather than metallurgical deficiency.

Not so well known is the fact that magnesium has seen considerable service in civilian products other than aircraft. Sand and die-cast magnesium housings for portable electric and pneumatic tools were being used long before the war. Lightweight handling equipment, such as conveyors, dockboards, hand trucks, lift trucks, dollies, loading platforms, can forks, and wheelbarrows have been produced which reduce fatigue of workers and labor costs. For example, two men can handle a 200-pound magnesium dockboard, while a whole squad of men was needed to move the 625-pound steel one it replaced.

Textile machinery and equipment manufacturers have used magnesium for many reciprocating parts such as traverse bars, knitting bars and pickers, and for bobbins, pirns, and warp beams.

IDEALIZED MODEL indicates the basic process of the Dow Chemical Company for extracting magnesium from sea water as used at Freeport and Velasco, Texas. The same general idea is followed out in extracting magnesium from natural brines, such as those pumped up from underground brine lakes, with some modifications depending upon the type of material locally available. Dolomite or other limestones, for example, may be used in place of oyster shells as a source of lime. Varying concentrations of magnesium chloride in different brines and other chemical compounds present may also necessitate certain modifications in the basic process.



When all magnesium was allocated to the war effort, the manufacturers of warp beams had to substitute fabricated steel beams which were twice as heavy. They report that even though the magnesium beams at present are more expensive, their customers are anxious to replace the wartime steel beams with magnesium. Their lightness, rigidity, strength and durability make them highly superior.

THEATRE POSSIBILITIES

General Considerations

Although most of the equipment mentioned is not of direct interest to theatre designers and owners, it has been described simply to illustrate the properties of the metal and the variety of ways in which it can serve. In addition to properties, available forms, and serviceability, the theatre industry will be vitally interested in the surface quality and types of finishes applicable to magnesium.

For exterior exposures, magnesium is highly resistant to corrosion in ordinary atmosphere, and in salt water atmosphere is better than iron or ordinary steel, though not as resistant as stainless steel. For the latter type of service, suitable paint systems provide adequate protection. The metal is first given a chemical treatment, such as chromepickle, and zinc chromate primers are recommended before application of suitable weather resistant paint.

For interior use almost all types of decorative paints may be used, such as the baked enamel finishes, crackle paints, and pigmented lacquers. Decorative chemical finishes have also been developed. One of the best is an anodic coating which provides good protection and abrasion resistance as well as pleasing appearance. This coating may also be dyed to many different colors.

The cost of magnesium to the pound is slightly higher than for the other common metals. When making a cost analysis of magnesium, however, users should keep in mind that, although metals are purchased on a pound basis, they are most often used on a volume basis. Because of magnesium's lightness, fewer pounds are required than with other metals, savings may be realized on machining, shipping, and handling costs, and the resultant weight reduction may be worth cost savings to the consumer. These factors should be taken into consideration in analyzing the economies of using magnesium. In some products a manufacturer may actually realize cost savings through using magnesium. The cost of other products may be higher, but the use of the lighter product may result in savings to the ultimate consumer.

Specific Suggestions

There are dozens of ways in which theatre designers and theatre equipment suppliers can probably utilize magnesium to advantage. These might be classified into four different groups—architectural or structural members, projection equipment, maintenance equipment, and miscellaneous equipment.

Architectural applications for magnesium include spandrels, marquees, gates, doors, lighting fixtures and hardware. Marquees should particularly benefit by using magnesium structural members. Here is a part of a theatre in which weight has no useful function, and each additional pound necessitates additional structural supports. Consideration has already been given to lightweight spandrels in large buildings. A variety of decorative finishes could be used to obtain artistic effects. Portable stage platforms and orchestra platforms which must be raised and lowered could be made both lighter and more durable by using magnesium.

Some manufacturers of projection equipment are already using magnesium to advantage. Projector parts (usually die cast), film magazines, and other items have been made. In such equipment not only lightness is an advantage, but the thermal conductivity of the metal is important.

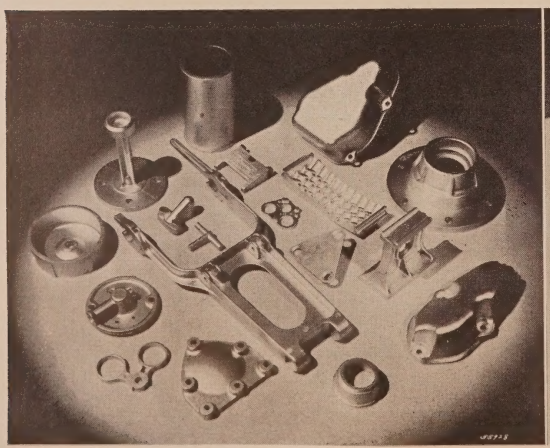
Maintenance of any building constantly used by the public is a considerable cost item. Care of the beautiful rugs and carpets in theatres, for example, is a constant problem. Cast magnesium parts are already being used in vacuum cleaners. The lightness of these units saves wear on rugs in cleaning, and enables the maintenance worker to do more work with the same amount of effort. Magnesium ladders are now being made which are safer and more durable than wooden ladders, and considerably lighter than those of steel construction. Lightweight scenery handling equipment, hand trucks, and other items could be truly labor-saving devices.

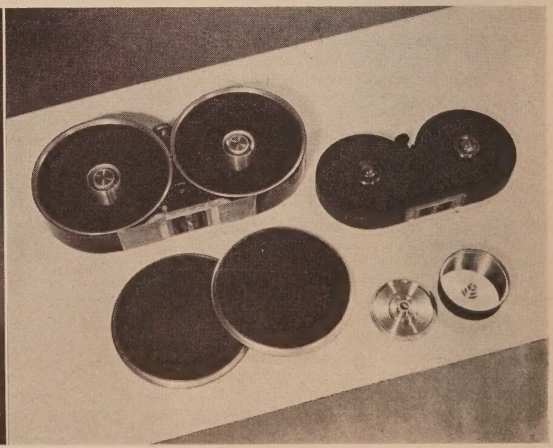
Air conditioning is used in every good theatre. Large magnesium fans have been used for a number of years, in which this lightweight metal reduces the effect of centrifugal forces and lowers power requirements because of reduced inertia. Theatre owners might well consider the use of magnesium in cooling fans as a means of cutting operating costs. Letters and numerals, signs, and display racks and cases which must be constantly changed and handled manually, auditorium seats and miscellaneous furniture are other types of equipment in which magnesium could be used to advantage. Magnesium furniture has already proven highly serviceable. For example, one hundred magnesium ballroom chairs have been in service in a certain country club for over ten years. They are lighter than comparable chairs of wood construction, have never had to be repaired, yet are still in excellent condition with respect to both rigidity and finish.

* * *

New structural metals do not come into being every day or every year. Here is an opportunity for all concerned with theatres to take advantage of a metal which went into a war comparatively unknown and has come out a youthful but full-fledged member of our group of structural materials. The door has been opened on a whole new field for the designer's imagination.

DIE CASTINGS OF DOWMETAL indicate the great variety of forms (left) to which the Dow Chemical Company's metal can be put. At the right are film magazines for sub-standard motion picture cameras, where the properties of magnesium stand in good stead. In the text are noted other uses for the metal in theatres, where strength and durability can be combined with lasting beauty. Some possible uses of magnesium in the theatre of the future are outlined in the text.





A "Natural" for the Theatre: Plexiglas

The "Plexiglas Theatre" Here Presents What Can Be Done with One New Material

By Janet Newkirk

Peacetime reconversion has brought good news to the theatre architect and the stage designer in the release to general industry of the great acrylic plastic of the military world—Plexiglas*. Although it was actually introduced several years before the outbreak of the war, the structural and decorative possibilities of Plexiglas were only beginning to be realized when the entire output had to be directed to manufacturers of war material.

PROPERTIES OF PLEXIGLAS

Under the gruelling demands of air combat in all sorts of weather conditions, Plexiglas established its stability and dependability, fully meriting its reputation as aviation's standard transparent plastic. The superior qualities of Plexiglas were also recognized on the sea—even under the sea—in many applications on boats and submarines. Strength, weather and chemical resistance, light weight and permanent transparency are features which made Plexiglas popular in all branches of the Armed Services.

*Trade name, registered with the United States Patent Office, for the acrylic resin thermoplastic sheets and molding powders manufactured by Rohm and Haas Company.

Ease of Fabrication

These important properties, added to the ease with which Plexiglas can be formed, sawed, drilled, and carved, have taken hold on the fertile imagination of the theatrical designer, who finds Plexiglas one of the most versatile and rewarding materials at his command. Plexiglas is supplied by the manufacturer in sheets of various sizes and thicknesses, and in rods of many diameters; it is available as crystal clear, translucent, or opaque material, either colorless or delicately tinted, or in the rich hues of stained glass. It is light in weight, being less than half as heavy as glass, and yet it is remarkably strong; it will support a heavy weight, and, in furniture manufacture, it has been found as tough as spruce.

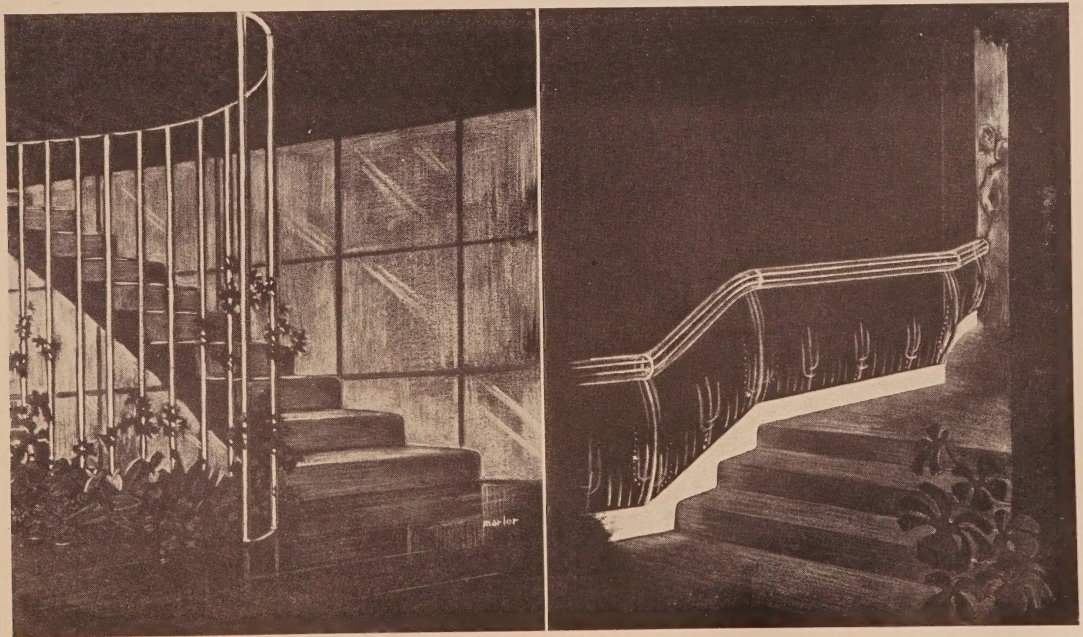
Important for Safety's Sake

Equally important to theatrical architects or designers are the safety factors contributed by Plexiglas as a basic material. It is shatter-proof and for practical purposes may be considered unbreakable, for it will withstand tremendous strains. When rigidly held and violently struck, it may break, but then only into large, dull-edged pieces. It is an excellent electrical insulator, and is widely used in lamps and electrical appliances. Plexiglas is not fire-proof, but it is fire-resistant; it is possible to ignite it by direct contact with an open flame, under which circumstances it burns slowly, in the manner of soft wood. Under no circumstances does it flare up, and it cannot be ignited by incandescent or red-hot metals. It is easily kept immaculate and sanitary simply by washing with soap and water. The crystal-like surface brilliance is maintained by such treatment, aided by an occasional waxing with a good paste wax.

A "NATURAL" FOR THEATRES

Plexiglas has more to offer the modern theatre, perhaps, than any of the other fields of building and decoration in which it is already being widely used.

RODS OF PLEXIGLAS (left) provide support for trailing vines while serving as a source of light. A concealed fluorescent tube at one edge provides light which is piped by the Plexiglas, to be given out wherever the surface has been roughened or sanded. A stairway (right) is bordered by a sidewall of Plexiglas whose top edge curves into a gleaming hand rail. Sanded strip at the base illuminates the stairs, and etched designs above are picked out in light from the same concealed source. Thus the light-transmitting characteristics of Plexiglas contribute to the safety of these otherwise hazardous locations in the theatre.



THE DRESSING ROOM of the Plexiglas Theatre achieves functional beauty. Radiant walls illuminate the room through designs etched in light. Drawers are lined with Plexiglas to prevent snags, and hassock and fixtures of the same plastic emulate the beauty of crystal without its weight and chill to the touch. The wash basin is of opaque Plexiglas, as is the toilet, walled off for privacy by Plexiglas prisms which admit light but not vision.

From the lobby to the stage and on to the dressing rooms beyond, the hypothetical Plexiglas Theatre profits by the innovations made possible by this versatile plastic.

Lobby

Entering the lobby, one notices that its subdued lighting comes not from shaded fixtures, but from designs which glow mysteriously out of the walls themselves. The stairway sweeps upward, outlined by an out-curving Plexiglas panel whose curled edge forms a gleaming hand rail. Both panel and rail are accentuated by delicate designs etched in light, and a strip at the base casts a soft, definite glow on the stairs themselves, from a concealed light source.

Wash Rooms

In the washrooms, Plexiglas adds new beauty to the utilitarian. Wash basins, far lighter in weight than the porcelain variety, may be fashioned in delicate pastel colors if preferred. Toilets have smoothly functional lines which conceal plumbing and permit easy cleaning. Faucet handles, strong and crystal clear, can be streamlined for pleasing design and, of course, eliminate metal-polishing.

Transparent Plexiglas towel-cabinets make the towel supply visible at all times, the rounded contours of such cabinets doing away with objectionable sharp corners.

Even when opaque shades are preferred, Plexiglas cabinets are still superior because of the flexibility of design which the properties of this material make possible.

Light, shadowless and efficient without being over-bright at any one spot, emerges from the entire wall surface through engraved designs in its Plexiglas facing.

Auditorium

In the auditorium, "crystal" chandeliers flash sparkling beauty from overhead—but being made of Plexiglas, are much lighter in weight than ordinary chandeliers.

Seats are fashioned of the same material in darker color, curved for maximum comfort, with the arm-rests pleasingly warm to the touch.

Under-seat hat racks, also of Plexiglas, are strong and rustproof.

At the exit doors, edge-lighted signs with the letters etched on panels of red Plexiglas are easily seen but not distracting. An inconspicuous clock with edge-lighted hands and figures is a convenience appreciated by the commuter.

Dressing Rooms

Actors' dressing rooms incorporate many of the features already enumerated; Plexiglas chairs have charm without chill; a "lazy-Susan" rack of plastic keeps hats, wigs, etc., within quick reach —and costumes are hung on Plexiglas hangers shaped to protect against distorted shoulders and slipping straps.

On the Stage

In the Plexiglas Theatre too, of course, "The play's the thing"; but it goes without saying that the way in which a play —and more particularly a revue or extravaganza— is staged can do a lot to tip the scales toward success. Modern use of plastics in furniture, fixtures, and murals "painted in light" can give an air of indescribable elegance and beauty, and permit novel effects obtainable by no other means.

Picture a revue or a ballet staged against a background of decorative motifs which can be changed during the action without dropping the curtain or moving any component parts of the set. An undersea design, perhaps, glows in blue-green light; the action progresses— the undersea motif fades and a cave appears, with sparkling stalactites and jagged rocks silhouetted against a flame-colored hint of fiery recesses; then a forest of green branches, brown trunks and huge, yellow toadstools; and so on, according to the demands of the piece and the imaginative invention of the stage-designer.

"Murals in Light"

Such striking and effective results are made possible by utilizing the "light-piping" property of Plexiglas. This fascinating ability to transmit light without disseminating it means that light entering one edge of a Plexiglas surface— from a concealed source, if desired — can be carried around corners and over curves, being emitted only when it reaches an interruption in the normally smooth surface. A property which is used, among other applications, in certain surgical instruments, its chief interest to the theatrical designer is in the "mural etched in light." Sheets of Plexiglas, either clear or in varying colors, are separately engraved, each sheet with its own design or element of the overall scheme, and the sheets superimposed upon each other. Then by means of switching on and off a light source at the edge of each component sheet, the background will glow with a succession of designs or scenes—or the lighting of all sheets at once can produce a multi-colored, three-dimensional mural.

UTILIZATION

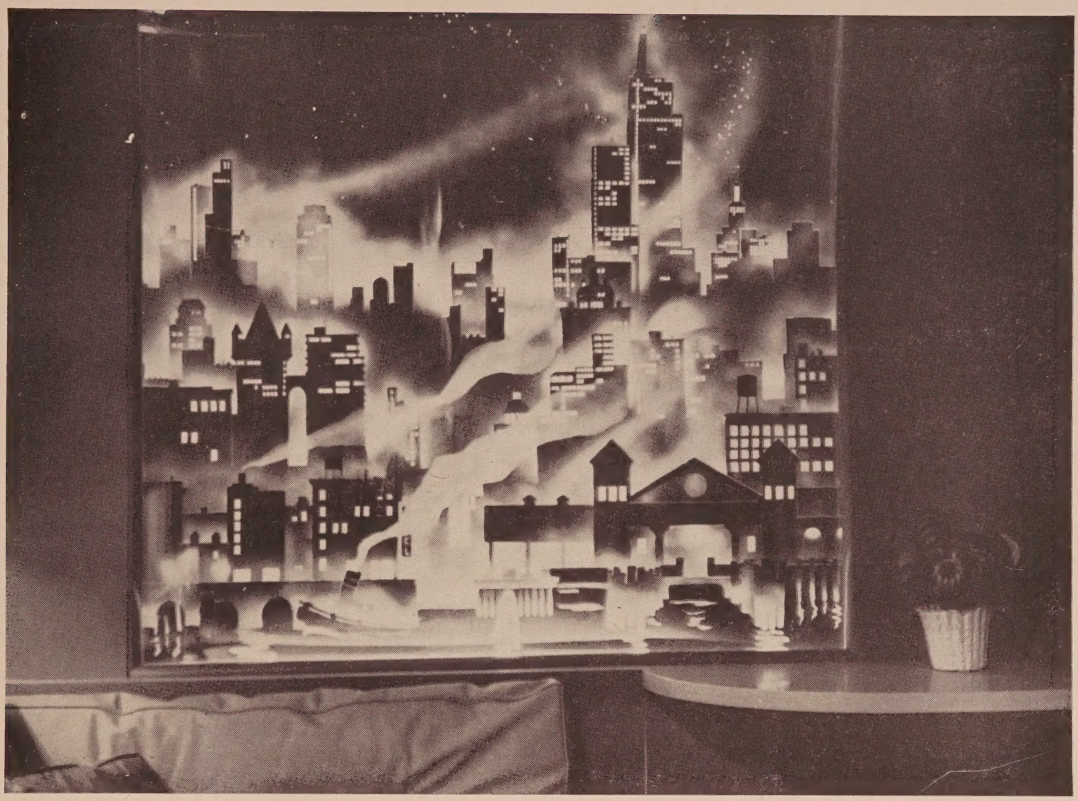
By choosing varying basic shapes of the plastic material, as well as in the carving, painting or sanding processes employed, an endless variety of effects may be obtained. Rows of prisms make a sparkling crystal-like wall which reflects light but does not permit vision. Clear sheets may be substituted for glass in windows, mirrors, etc., to avoid danger of breakage.

Aside from its outstanding decorative possibilities, Plexiglas provides an ideal material for stage design because of the great ease with which it can be formed and worked. Most other basic structural materials require heavy machinery for their fabrication, and special design means prohibitively expensive hand tooling and machining; Plexiglas, by contrast, can easily be sawed, drilled, carved or threaded. Pieces may be joined by simple cementing processes to form strong units in which the seam is practically invisible. Plexiglas softens when heated to a little above the temperature of boiling water, and in this state it can be bent, curved, or fashioned into any desired shape — a fact which has been found valuable by the many home craftsmen who are turning out their own intriguing products with the aid of the kitchen oven and a few inexpensive tools.

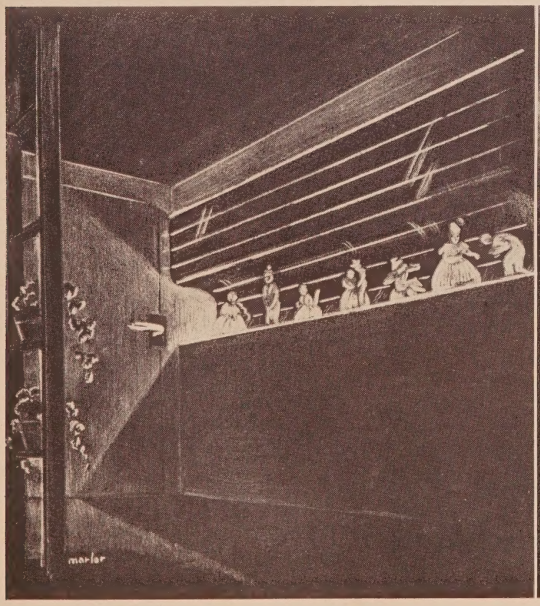
This ease of fabrication becomes a boon to the imaginative stage designer, who can now readily achieve effects which were formerly impracticable. Plexiglas does not lose its strength, clarity or other properties on repeated working; this means that existing shapes in Plexiglas can be changed by re-heating the material—an important factor in economy, especially in theatres where a weekly change of stage revues means frequent replacement of stage settings.

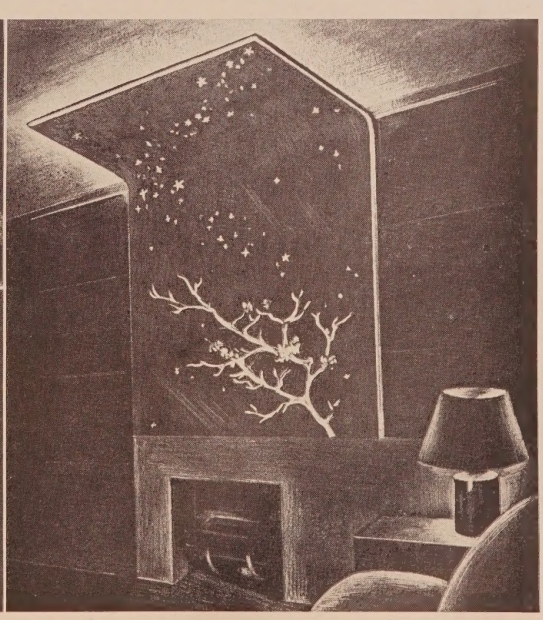
CONCLUSION

All in all, theatrical architects and designers are finding Plexiglas a most useful material for a steadily increasing and seemingly endless variety of purposes.



"MURALS IN LIGHT." Above is seen a four-color mural "painted in light," with three-dimensional effects, achieved by superimposing four sheets of variously colored Plexiglas etched in separate design elements. Below (left), illumination is provided by a scored sheet of curved Plexiglas behind the figurines, as well as by the base of translucent Plexiglas on which they rest. Plexiglas murals (right), etched in light, give softly diffused illumination to the theatre foyer or lounge. The photographs and drawings in this article have been provided through the courtesy of the Rohm and Haas Company, makers of the acrylic plastic, Plexiglas.





Chemists' Developments Find Theatre Uses

Lucite, Nylon, and Plastic-Coated Fabrics To Make Contributions to Post-War Cinemas

By Frederick R. Long
Public Relations Department, E. I. duPont deNemours and Company, Inc.

With war restrictions on building construction and improvement removed, many theatres, both legitimate and motion-picture, may be in for a face-lifting job. New products of the chemical industry and new applications for old products undoubtedly will influence many proprietors to remodel and renovate their properties, both within and without.

A progressive renovation policy has been known to hold many theatre patrons in the face of keen competition. Lack of adequate air-conditioning equipment or none at all is, of course, known to drive patrons into the competitor's door. Theatres that need interior rejuvenation generally do not tend to increase their clientele.

Theatre managers must keep a step to the fore in such matters as architectural design and decoration. Showmanship demands it. In this they have a kind of spiritual kinship with the ever-innovating chemical industry. The showman is the first to want to know about the possibilities of anything new from the laboratories. With change likely to be the rule in the post-war world, it may be useful to take a look at how chemical research is now affecting theatre operation and the influences it may bring to bear in the future, based on activities of the E. I. duPont deNemours and Company, Inc., as a leading manufacturer of chemical products.

Plastics are a good example. While the DuPont company does not expect plastics to be used to any extent as weight-bearing structural members, it is considered likely that they will be found on maintenance equipment and as part of the furnishings and decorations of the average theatre.

LUCITE

The properties of Lucite methyl methacrylate resin, which is an acrylic plastic —crystal-clear, light in weight, and shatter-resistant—make it exceptionally attractive for decorative purposes, particularly for murals, edge-lighted signs, hand rails, and the like.

Lucite push-and-pull bars for doors are already in use in a number of theatres and it is possible that mirrors of Lucite and other plastics will be quite widely used in theatres due to their toughness. Other applications, which employ the material's light-transmission characteristics to good advantage, are likely to be mighty welcome in a movie theatre. A bent Lucite rod, for instance, can pipe light around corners and may serve to keep the exit or aisle light glare from patrons' eyes.

The possibility of using Lucite sheeting for the face of shadow boxes used on theatre marquees is already in the experimental stage by several individuals, and the results look very promising. Lucite, as is well known, has good weather-resisting and light-carrying characteristics. Some precautions would have to be taken with high-wattage bulbs, but other than this the current grade of sheeting appears to have good possibilities, particularly with the fluorescent type of lighting.

Electrical switchboards and other lighting backstage may involve much use of this material. In many cases, small molded caps of this plastic in various colors are now used on switchboards.

A reflecting lens of Lucite constitutes an important part of a television system now being developed by the RCA Victor Division of the Radio Corporation of America for post-war theatre use. The lens is part of a projecting system employing the optical principle of the Schmidt astronomical camera, but extensive development was required to adapt it to short-throw projection. The high cost of a hand-ground glass correcting lens has been overcome, however, by the development of the methods and equipment for molding the aspherical correcting lens from clear plastics.

OUT OF AN INEXHAUSTIBLE SOURCE of raw materials—coal, air, and water—chemists have been producing new and vitally important products, like Lucite, the crystal clear plastic manufactured by the E. I. duPont deNemours and Company, Inc. Lucite is clearer than glass, has the ability to pipe light around corners, possesses freedom from color, with strength, lightness, and weather resistance. The photograph, emphasizing the transparency of Lucite, shows one of the many inspections the material must pass in process of manufacture.

NYLON AND POLYTHENE

Both nylon, as a plastic, and polythene are highly serviceable as insulating materials and are likely to be of considerable importance in the projection booth and on other theatre equipment. The new nylon compound, which can be applied as a coating on wire at rates of more than 1,000 feet a minute, offers a tough, abrasion-resistant compound for sheathing cables or for the manufacture of tubing. Polythene, the generic name applied to polyethylene plastics by the Imperial Chemical Industries, Ltd., and adopted by DuPont, combines remarkable insulating properties with extraordinary lightness. It is tough, flexible, and has excellent chemical resistance.

PLASTACELE

Public lounges and back-stage dressing rooms no doubt will utilize Plastacele cellulose acetate plastic for fluorescent lighting shields. This material, a veteran in the comparatively young field of plastics, in combination with opaque or translucent louvres, is marketed in the lighting field under the trade-mark Louverplas and is used extensively on fluorescent equipment. The function of this type of lighting shield is to reduce the glare of fluorescent lighting and concen-

trate the illumination. By means of the louvres, various degrees of illumination are produced, depending upon the angle from which the fixture is viewed.

FREON

The two new plants, built by Kinetic Chemicals, Inc. (in which the DuPont company and the General Motors Corporation have a 51-49 interest), for the manufacture of Freon 12 (the refrigerant, dichlorodifluoromethane), have accumulated a backlog of production capable of meeting military demands, and, at the same time, restoring cool comfort to theatres and other places. Steady production, together with some easing in the supply of hydrofluoric acid required in the Freon process, has finally overtaken shortages, so that Freon 12 is available in sufficient quantities for all military and civilian needs.

FIRE-PROOFING

Efforts to protect fabrics from damage by fire have been made periodically for the past three centuries, but it has only been within recent years that chemicals have been developed that are easy to apply and which do not affect the appearance and feel of the cloth. One of these is ammonium sulfamate, a salt of sulfamic acid. The acid itself had been known since 1876, but it did not become available in quantity until a few years ago, when an economical process was developed by DuPont for manufacturing both the acid and the ammonium sulfamate on a large scale.

PLASTIC-COATED FABRICS

A new fire-resistant, plastic-coated upholstery fabric seems destined to find a post-war usage in theatres. The fabric consists of a flame-proofed cotton cloth base with a flexible, fire-resistant surface coating of synthetic resin. The material will char in contact with a flame, but will not support combustion. Known as P.C. Cavalon, it will be available in a range of colors, grains, and finishes when war demands are met.

Fabrikoid pyroxylin-coated fabric repsents a pioneer plastic treatment, and is washable, durable, and colorful. Wearing qualities and scuff-proof properties have already won Fabrikoid wide acceptance among architectural specification writers as the covering for public seating.

NEOPRENE

Neoprene, the only general-purpose synthetic rubber produced in the United States before the war, may be put to many theatrical uses when it is released from its war assignments. Invented by DuPont chemists, basing part of their work on acethylene researches of the late Father Julius A. Nieuwland, C.S.C., of the University of Notre Dame, neoprene was found to be superior to natural rubber in many ways—resistance to oils, acids, sunlight, flame, and oxygen-aging, to mention its outstanding properties. Therefore, it has been called upon not only to replace natural rubber in certain uses, but to perform numerous tasks for which natural rubber and other synthetic rubbers were not suited.

Just as in the case of crude natural rubber, the crude neoprene must be compounded and cured before it possesses the toughness and resilience characteristic of the finished product. These processes are carried out by good rubber manufacturers, who add compounding ingredients such as carbon black, oils, etc., and vulcanize to obtain the desired properties in the finished article.

Foam sponge made from neoprene latex can be used to cushion theatre seats and covering fabrics made of neoprene are ideal for this product. Neoprene foam sponge is especially adaptable for seat fillers because it resists deterioration from heat, aging and dry-cleaning solutions, and is non-flame propagating. Cushion fillers are also made from neoprene latex and cattle hair.

Theatre seats will utilize upholstery fabrics coated with neoprene because of its flame retarding properties and resistance to heat, perspiration, dirt, and grease. DuPont's S.R. Cavalon neoprene-coated fabric offers an unusual post-war upholstery covering of unique quality characteristics for heavy duty deep spring seating in theatres.

Neoprene latex bids fair to replace rubber latex for aisle-carpet backing. Neoprene has a superior aging resistance and freedom from any tendency to become sticky with age and hence adhere to the floors.

A new type terrazzo flooring in which marble chips are stirred into neoprene latex is an interesting possibility for lobby and washroom flooring. The mixture may be poured on almost any floor surface, and troweled and sanded to form a resilient, durable, and non-slippery surface.

A pre-war item which should find wide application in the post-war theatre is Velvetex. This DuPont product is a sponge rubber rug cushion for theatre aisles and lobbies.

CONCLUSION

These are examples of chemical products that are likely to take their place on the theatrical stage in the post-war era. Numerous others undoubtedly will follow in uniting the decorative arts with solid utility, goal of the theatre designer.

FILM OF NEOPRENE, as it leaves the drier, is twisted into the form of a rope and cut into short lengths. This product of the E. I. duPont deNemours and Company, Inc., was the only general-purpose synthetic rubber produced in the United States before the war. During the war, many new uses were found for the material, and many of these uses will now be translated into civilian terms for manufacturing in the post-war years.

Some Future Uses of Plastics in Theatres

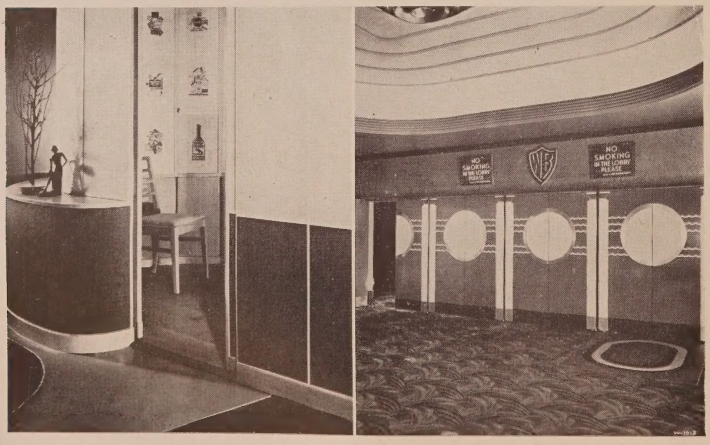
A Brief Review of Possible Developments To Bring Beauty and Utility to Theatres

By Barrett L. Crandall
Director of Public Relations, Society of the Plastics Industry

Carrying the hallmark of proved quality, by having played an important part in the defeat of moves to destroy our way of life, plastics today stand ready further to enhance the peace that has been won. Confidence in their ability to make the world a better place to live in is the result of plastics' having met and exceeded expectations under the most severe conditions that Nature and Man could impose. They face the peace years ahead, not as untried innovations, but as materials which have proved themselves fully qualified to supplant or supplement others which have long been considered irreplaceable.

The part that plastics will play in construction of the future is beyond prediction. How far they will be utilized will depend chiefly upon the resourcefulness and ingenuity of the chemists and engineers, the architects and builders. No one yet has discovered the limit on these qualities; hence, plastics may honestly be characterized as having horizons unlimited. From roof to basement, in all types and grades of buildings, they are certain to be performing important functions. But assertions by the uninformed, that plastics will revolutionize construction, cannot be taken seriously as yet. Plastics materials, which may eventually prove to be applicable to construction uses, are still largely in the laboratory stage.

MANY PLACES IN THE THEATRE are possibilities for the future use of plastics, such as the products represented in these four pictures. Above (left) is plywood, bonded with the Plaskon urea-formaldehyde glues of the Plaskon Division of the Libbey-Owens-Ford Glass Company; and (right) decorative laminated plastics made with Bakelite resin varnishes of the Bakelite Corporation. Below (left) is seen architectural plastic paneling striped with moulding of Tenite, manufactured by the Tennessee Eastman Corporation; and (right) doors made from Formica, product of the Formica Insulation Company.



It will be in the interiors of new buildings which will be erected and other buildings which will be altered or modernized, that plastics will be widely used. Floor and wall surfaces, which are both wear-resistant and color-retaining, will be products of the plastics industry for builders to use. Molding and trim in any desired color and shape will also be available. Replacing hardware will be knobs, hinges, drawer-pulls, and similar items made from plastics and offering many advantages which metal counterparts cannot duplicate.

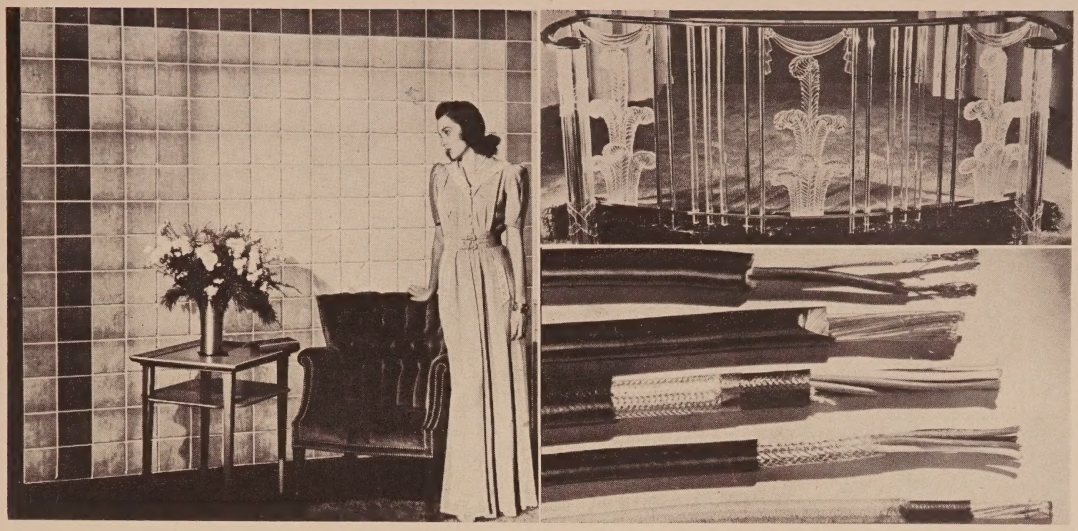
Resin-bonded plywoods with plastics facings will undoubtedly be in wide demand for use as walls and partitions in homes, offices, theatres, stores, hospitals, banks, restaurants, and libraries. Because post-formed plywoods can be produced in special shapes, extensive use in cylindrical air ducts, columns, bar fronts, and similar applications is anticipated.

Another group of plastics products, known as low-pressure laminates, is already capturing the fancy of many architects and builders. These laminates have aroused the interest of home designers, particularly because of their adaptability for use in walls and partitions, but more especially because of their fitness in making complete units for bath or kitchen, in which tub, shower, toilet, and lavatory are designed as one unit, or sink, stove, refrigerator, and water-heater as one unit.

Electric service and lighting will also be improved by the plastics industry. Wiring insulated with plastics and distinctive in color to facilitate tracing of lines and making alterations or extensions, will be provided. Floor and wall outlets in harmony with their surroundings and in a variety of styles, instead of rigidly uniform, are assured. Lighting fixtures and lamps of unexpected beauty of design and color will be available to add to the effectiveness of the daintiest boudoir or the efficiency of the atre office or plant.

Venetian blinds, grilles, decorative screens, and partitions, even translucent or transparent bricks or squares for walls, are among the plastics products which the industry will be able to supply the builder.

In the furnishing of homes, offices, theatres, and other structures, plastics will also play an important part. Permanently

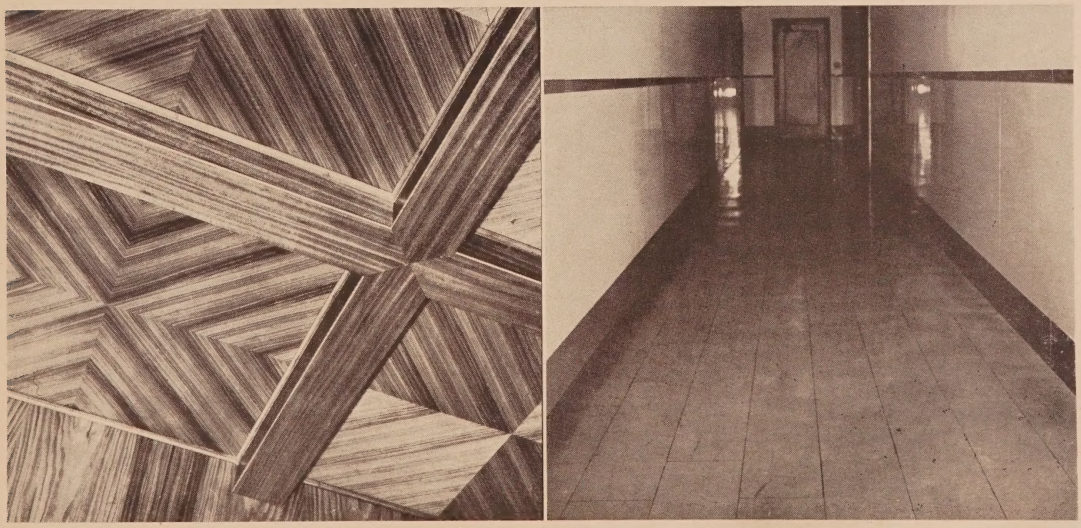


IN DECORATION AND UTILITY, plastics will have their uses in the theatres of the future. In toilets and other places where the effect of tile is desired, products, such as Lumitile (left), from materials of the Monsanto Chemical Company's Plastics Division, might be used. Decorative ballastrades (upper right) can be made from crystal-clear resins, such as (shown here) Lucite, product of E. I. duPont deNemours and Company, Inc. Wire and cable insulation (lower right) made from Vinylite, a product of the Bakelite Corporation, offers resistance to moisture, flame, oxidation, and abrasion. The theatre uses of this are obvious.

placed or portable tables with laminated tops which are resistant to acids and alkalis, scratches, and marring, yet highly decorative in design, are already being offered. Along with these are desk tops and other working surfaces. Chairs constructed of laminates and upholstered with wear- and stain-resisting plastic-treated fabrics will prove a boon to home-makers, theatre operators, office workers, and others who have been beset with the problem of keeping furniture attractive without long hours of wearisome maintenance.

Strides forward in supplying articles for the public are being taken so rapidly and effectively by the plastics industry that it is almost impossible to set forth what it can or will do. Without undue optimism, it can be promised that plastics will play an important part in construction of the future. They will add beauty, fire resistance, utility, and service qualities which other materials will not be able to excel. Being many in number and with widely varying properties, there is only one course for the potential builder, if he wishes to have the utmost in beauty and utility—watch plastics.

FLOORS AND CEILINGS are also places where plastics may be utilized. At the left is seen one of the ceilings of Plaskon-bonded plywood in the office building of Dominion Plywoods, Ltd., Southampton, Ontario. Floors, walls, doors, and most office furniture were also made of plywood bonded with Plaskon, a material which in this country is produced by the Plaskon Division of the Libbey-Owens-Ford Glass Company. On floors, tile molded from Vinylite (right) help to reduce maintenance costs. The Bakelite Corporation can produce this Vinylite tile in a wide variety of colors and designs for any purpose which may be desired.



War Forces Developments in Use of Cement

The Utilization of Wartime Advancements Valuable in Construction and Decoration

When war called a sudden halt to private building, contemplated construction of new theatres and modernization of existing theatres went into the post-war file. When peace returned and restrictions were lifted on private construction, many people naturally assumed that pre-war plans for new buildings would go back on the boards without change—that planning and construction would be resumed where it stopped. This thinking reckoned without the stimulation which the emergency of war gave to all construction.

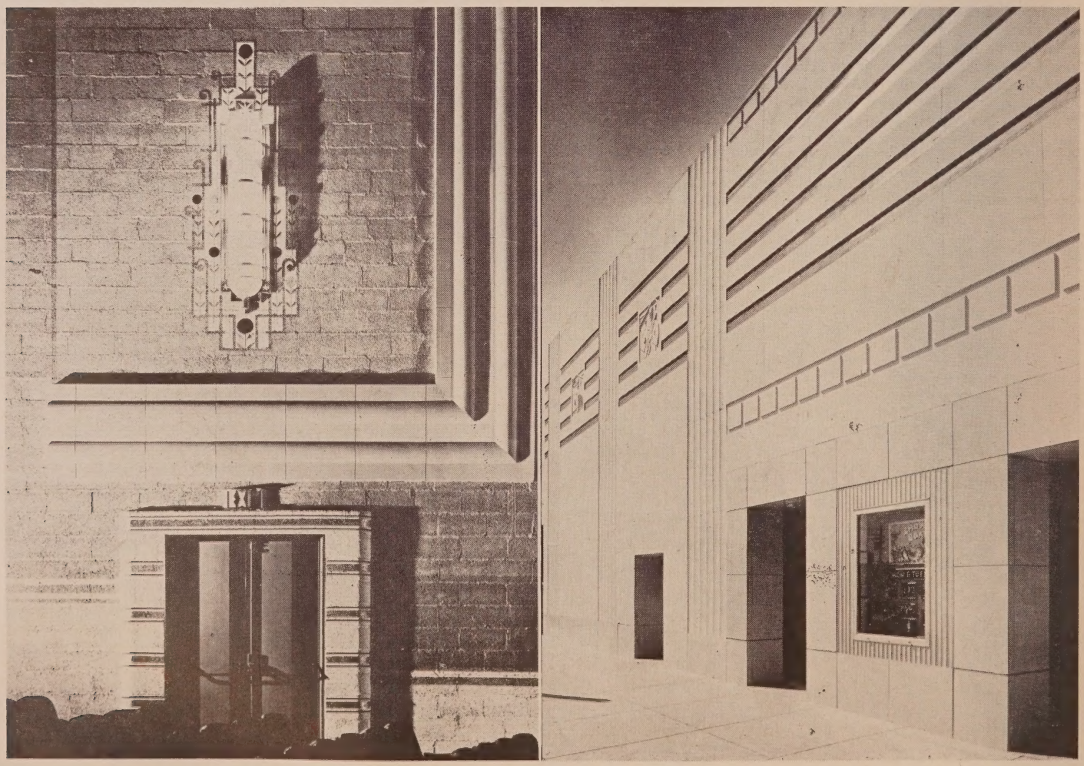
The vast war-construction program gave structural engineers the opportunity to apply all their knowledge—even compelled its application. Materials were used in new ways. Unusual methods of construction were applied on a vast scale to expedite completion of structures vital to the war program.

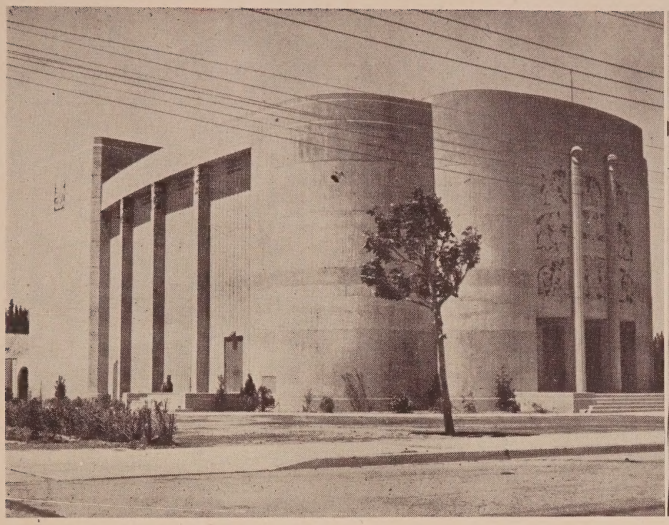
As a result construction methods made rapid advances. Thousands of architects, engineers, contractors, and building craftsmen learned short cuts and new skills. Critical shortages of some types of building materials compelled uses of available materials in new ways. And concrete fitted into the war building program in thousands of ways. Except for reinforcing steel and form lumber, there were no critical shortages of concrete materials even at the peak of war construction.

Although concrete had for many years demonstrated its utility as a fire-safe, durable material, capable of brilliant architectural treatment, it took the war to reveal its untouched possibilities as an economical structural material to a vast new host of architects and engineers. Concrete has since not only been used for purposes which traditionally called for other materials, but the necessity of speed in completing war structures brought out new techniques in design and construction which, now that peace has returned, will make concrete one of the most economical of all building materials.

Among the relatively new structural uses of concrete, that were perfected and tested during the war, are long span, continuous concrete members, such as rigid frames and thin barrel shell roofs. These uses apply definitely to theatres, auditoriums, churches, gymnasiums, schools, and shops. They produce clear areas without intermediate column supports, improved fire safety, and open up unlimited possibilities for architectural treatment. Such construction is com-

THE WILL ROGERS THEATRE, in Chicago, has a modern reinforced concrete interior (left), finished with lightweight concrete masonry selected for its acoustical and decorative properties. The flutes and rustication which comprise the principal details of the exterior walls (right) are architectural concrete formed against milled wood molds. The symbolic plaques were pre-cast in concrete and placed in the wall forms. Plain surfaces were painted buff, the rustications a pleasantly contrasting shade of green. The theatre was designed for Balaban and Katz Corporation by C. W. and George L. Rapp. (Portland Cement Association photo.)





SWEEPING CURVES AND SCULPTURED DETAIL take full advantage of the plasticity of concrete in the construction of this auditorium (left) for the Union High School, King City, California. Robert Stanton was the architect, with Mac D. Perkins the structural engineer. The intricate sculptures over the entrance (detail of which is shown at the right) were molded in concrete. They are the work of Jo Mora, noted California artist, who frequently uses concrete for the fine, sharply formed effects which may be obtained in this modern medium. (Portland Cement Association photographs are used to show this new art medium.)

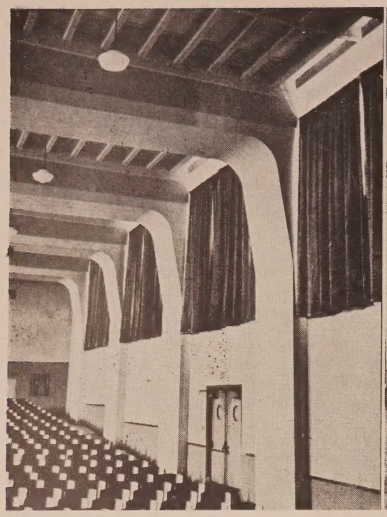
paratively simple and, since less material is required, both material and labor costs are reduced.

There are two types of concrete construction especially suited to theatres, churches and school buildings. Architectural concrete, in which strong, rigid walls, floors, and roofs of reinforced concrete are tied together in a continuous structure, has long been standard for fire-safe, storm-, and earthquake-resistant construction. It can now be used as economically for small buildings as for large, monumental structures.

Concrete masonry, used widely during the war for mass housing and various war buildings, has always been ideally suited for the small theatre, church, or school. One type of concrete masonry—cast stone—has been used as an exterior treatment on some of the finest temples and cathedrals. One of the important uses of concrete masonry made with lightweight aggregates will be interior facing for the walls of theatres, auditoriums, churches, and school rooms. This material has both decorative and acoustical advantages to add to its durability and low maintenance costs.

While some authorities doubt that the costly enrichment and lavish adornment which has distinguished theatres in the past will be called for in the immediate future, concrete offers the opportunity for the economic execution of any design treatment which may be desired.

THE ROOF OF THE GYMNASIUM SECTION of the Huron School, Huron, Ohio, consists (left) of three concrete barrel shells. Insulating material, used as the inside form, is integral with the arch barrels. Over the auditorium (right) the concrete barrel-shell roof is concealed by a suspended ceiling with cove lighting. Various color combinations of fluorescent lighting are controlled from the main switch panel. The school was designed by Harold Parker and C. Edward Wolfe, Sandusky, Ohio. Roberts and Schaefer Company, of Chicago, was the consulting engineer. Portland Cement Association provided these striking pictures.



THE DEEP BEAMS AND GRACEFUL COLUMNS that dominate the interior architecture (left) of the auditorium of the Bradford Avenue School, Placentia, California, are a series of five hollow concrete, rigid-frame bents, which form the structural frame of the building. Vigorous horizontal detail and strong concrete textures characterize the main facade (right) of the building. The picture was taken before application of the finish of portland cement paint. The building was designed by T. C. Kistner, with William T. Wright, structural engineer, and C. L. Wurster, general contractor. (Photograph furnished by the Portland Cement Association.)

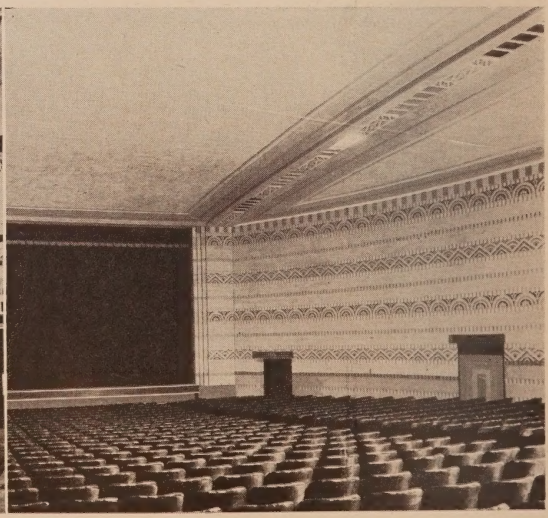
Architectural concrete has the advantage of being both a structural and a decorative material. For example, columns and arches which support the roof of a great auditorium can be molded of concrete in any decorative shape or design. The most intricate carving can be duplicated many times by repeated use of original molds at a fraction of the cost of carving separate stone or timber members.

Maximum safety for audiences has always been a primary consideration in theatre construction. Nothing has yet been developed to provide more positive protection than concrete affords against fire, storm, or earthquake damage. And in addition the great strength and durability of concrete construction produces buildings which retain their fine appearance for many years with modest expense for maintenance; buildings which give low annual cost service.

Even before the war many eminent architects and engineers had grasped the potentialities of concrete as an important material in theatre construction. George L. Rapp, widely known architect who has designed many theatres, made this comment on the completion of Balaban and Katz's Will Rogers Theatre in Chicago:

> The bars have been let down for architects who have long wanted a free hand to design in concrete, and with contractors amassing wider experience in the use of the materials on large, complicated structures such as bridges, there is now no limit to its use.

FOYER OF THE CIRCLE THEATRE, Detroit, Michigan, has walls (left) of lightweight concrete masonry units, painted. It was designed by Bennett and Straight, Dearborn, Michigan, with Board and Yates, East Detroit, Michigan, the contractors. The interior of the Tower Theatre, Detroit, Michigan, shows (right) the use of concrete masonry units for acoustic and the charming decorative characteristics. Theatre was designed by Arthur K. Hyde. Use of such lightweight concrete masonry units for interior walls takes advantage of the acoustic properties of the open texture of the face of the units. (Portland Cement Association photos.)



Hints on Remodeling Obsolete Auditoriums

Progressive Managements, Free Architects Will Create a New Era in Theatre Design

By WALTER SOBOTKA

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The majority of theatres in operation, and in particular motion-picture theatres, are obsolete. This cannot be blamed as a failure on the part of the architects who planned them; it is, rather, a natural phenomenon, with all other commodities as well, whether their requirements have changed or not. They change their appearance with time, either in a steady evolution or in abrupt revolutionary steps, whenever basically new requirements arise.

The obsolescence of theatres is a special case in many ways. Coinciding circumstances have brought things to an almost anachronistic condition. A comparison with other developments in means of transportation (railroad, automobile, ships), in engineering structures (bridges, fortifications) proves that a new type will invariably evolve out of new requirements, new materials, new technologies. For some time the old type may yet overlap into the new era, in a so-called "horseless carriage" stage, until the new type can freely develop according to its new function. Naturally, accommodations which are prejudiced by an old tradition will be slower in achieving their new type than those unprecedented and free of traditional associations (for example, the airplane).

THE OLD THEATRES

Despite the changes in operation, theatres have retained the old type of structure, decoration, and altogether atmosphere—and for various reasons.

First, theatres, like all building structures, are not easily replaced, because of the high investment and the time involved in construction, together with the financial loss by disruption of operation. Therefore, improvements have to be made by minor remodelings and adaptation, rather than by more radical means of reconstruction.

Second, the old tradition of theatrical festivity has not been abolished. Although the social implications have changed, the foyers and auditoriums keep up the illusion of a place for society and an atmosphere of dressed-up formality. There is some point in retaining such luxurious atmosphere, because of its flattering effect, even in present time, on the primitive mind of many customers.

Third: the gradual change from stage performance to mixed performances on stage and on screen has combined two very different functions of operation. Consequently, one of them—in this case the screen operation—has not received full recognition as to its requirements. Vaudeville acts, still included in the program of many theatres, make still more complex the final conversion into motion picture auditoriums.

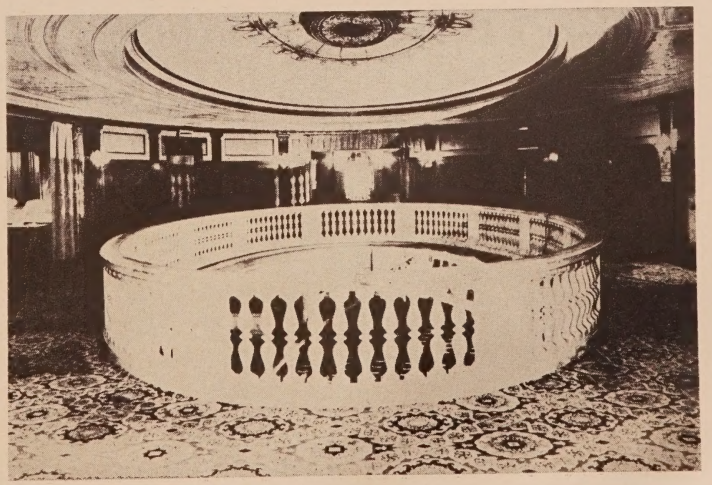
Fourth: A specific phenomenon in American architecture during the first decades of this century was lack of progressiveness. Classical academism, following the Ecole des Beaux Arts in Paris, was so strong that the "modern movement" had little influence on the general trend. In comparison, other countries show many progressive developments in theatre design. America has little or nothing to put up against them. Its theatres adhered persistently to the hollow academism, sometimes in a rather odd mixture of period styles. All efforts were concentrated on the lavish use of architectural motifs, which, in many cases, had to be distorted in an unorthodox way for the concealment of advanced steel construction. Sometimes one wonders how it could happen that, some 20 years ago, or even less than that, architects were still in this "Victorian" state of mind and had not learned the lessons of function and its expression from contemporary industrial design. This backwardness can be explained only by the persistence of theatrical tradition in displaying palace-like splendor, for which there was only one traditional expression: columnar architecture. Modern functionalism seemed to be too dry and utilitarian for such purposes.

Fifth: Wartime restrictions have, for several years, all but stopped the natural forward development; the more conspicuous is the anachronism of false marble columns, gilded cartouches, heavy stucco garlands, and red velvet hangings, in a time when unprecedented achievements of science make us feel that a new age is knocking at the door. Such inconsistency in cultural concerns cannot stay forever. Yet they have a tendency to drag on. The nostalgic preference for the good old times plays many tricks on public opinion. The wish to safeguard some of the charm of old times may be the reaction against too speedy a progress and the sacrifices necessarily involved.

All these factors have to be considered. In addition to them, the operation of motion-picture theatres has commercialized the ambitions of managements. The theatre operator is no more a "producer," but merely a "distributor"—and, in the manner of a distributor, he does his thinking and arguing when the question of modernizing the theatre comes up, "No reason for such expenses, as long as the volume of business is not endangered."

The following example may illustrate such a policy: When a new theatre is planned, the architect will conscientiously try to provide a satisfactory angle of vision for all seats; to do this he may have to sacrifice certain spaces,

A BALCONY FOYER is seen here, revealing the well hole opening into the rear of the orchestra. In a modernizing of this theatre, the closing of this well hole would be one of the first things that the architect would indicate. Many of the theatres built shortly after World War I utilized this type of construction, which seems now to be entirely without any justification, and no one is too sure what the original reason was, anyway!



he may have to shape the auditorium in a new way which will ask for wider spans, more expensive construction. The management, on the other hand, will spend more money only in proportion to increased capacity; its argument, that a portion of the seats may be rather allowed to have a poor vision, is supported by the experience that the perfect seats will be sufficient during the week, while the undesirable ones will yet be sold over the week-end rush—not one cent for the prestige of having the finest theatres, where all seats are equally desirable.

This example illustrates as well that there are always two different and often contradicting viewpoints in approaching a problem. The one thinks in terms of requirements and standards to be met in the most perfect way; the other thinks in economic terms of investment and returns. While the latter attitude cannot be disregarded, it should not kill the efforts of the former. Business people usually have a sort of pity for those "out-of-the-world" idealists who want to improve things. Yet history shows that a spark of pioneer spirit has at any time brought things forward, that it will pay in the long run. In fact, the builders of our presently obsolete theatres were in their time ready to spend tremendous sums of money for the intangible value of a theatrical atmosphere. Present managements still cash in on those generous investments and they hesitate to write them off completely.

CONSIDERING THE REMODELING

It seems reckless, indeed, to scrap marble, bronze, and elaborate workmanship, only to have it replaced by less monumental materials and less spectacular treatments. Yet, utter disgust with all this fictitious makeshift puts aside, at last, such materialistic reasoning. Despite the maze of astronomic sums spent on some outstanding theatres in the country and despite even some appreciation of their architectural elaboration, no reasonable person will any longer resist their condemnation. Other people, less sensitive to function and honesty in design, will yet become aware of their outdated character. The ever-growing fashion consciousness at present makes people sensitive, at least to the quality of being "up-to-date." Noncompliance with this commercial requirement stigmatizes the object in question as a potential "mark-down" item and reflects on the credit given the whole enterprise. Thus, apart from aesthetics, there is a purely psychological implication: people want to associate with apparently prosperous enterprises, and they use their judgment according to the evidence of such prosperity.

The moment is at hand when something decisive has to be done about obsolete theatres. Once a general start has been made, no one will stand back; competition is the best incentive for progress.

The next problem to come up is the economic evaluation of a potential remodeling. The theatre management will have to reconsider the desirability of its present location, the structural condition and the commercial value of the building and the prospective development concerning traffic, neighborhood, and the like. If all these present and prospective assets do not amount to much, it may be wiser to build a new theatre on a new site.

Another decisive factor is the adaptability of the old building, and whether the basic structure will lend itself to a thorough remodeling and is worth the effort, or does not guarantee good and economic results.

This consideration is very often neglected whenever a building of any type is to be remodeled. Frequently, the yet-existing value of an old building rests in the comparatively perfect condition of surfaces, such as wall treatment and floors, and in the technical installations, such as heating and lighting, rather than in the basic structure. Structural work in the wake of remodeling will affect if not destroy these main assets; they have to be replaced. Adaptability of a building means that important improvements can be made without destroying the existing assets. The raising of the value of a building by improvements should always keep within a reasonable proportion to the efforts necessary to accomplish them. If this principle were kept in mind, the often-occurring disappointment in remodeling jobs and their final costs could be avoided.

In many cases, of course, the outstanding location of a theatre, and the unique commercial value of this location, will be a major factor in over-ruling such a comparison of figures. The disruption of business in replacing the theatre by a completely new structure on the same plot may rather compel the management to go into a thorough remodeling which in itself could not be termed economical. The carrying on of the operation over the whole or, at least, a considerable part of the period needed for the remodeling will justify the decision.

Radical reconstruction rather than remodeling of a theatre will be necessitated, in most cases, by the demand for a considerable increase of capacity which cannot be gained by minor changes. The auditorium may be expanded in any direction where additional space is made available. In most instances, the ripping out of stage and backstage provides a wanted elongation of the house and the orchestra seating, a change, however, which cannot be confined to this part of the auditorium. Proscenium, ceiling, balconies will be equally involved, unless the reconstruction will miss its point.

The hull of the old auditorium has to be thoroughly reshaped; the balcony has practically to be replaced altogether by a new construction with larger seating capacity, a new slope; second balconies will be ripped out as a whole without any regret, so as to accommodate the new and longer main balcony; consequently stairs, lobbies, and foyers, vomitories and exits will be affected by the reconstruction. In fact, only the foundations, walls, and roof will remain. Besides, the main lobbies and foyer are usually part of a higher building along the street front, so they may not allow radical reconstruction. In other instances, a deepening of the auditorium towards the foyer may be feasable. If a building lot close to the auditorium has been acquired, the theatre may be widened; one side wall will have to be torn down, thus affecting the roof construction as well.

All these efforts come close to a new theatre. The comparison of costs (expressed in costs per seat) between this type of reconstruction and a completely new building may yet show a limited economy in favor of reconstruction. In addition, the loss by disruption of operation may be cut down somewhat. On the other hand, the figures do not expose the difference in quality of concept and design, in efficiency of operation and other important aspects which are likely to justify the more aggressive method of

STANDING ROOM, with a well hole and open stairs to the balcony, are seen here. The placement of the stairway at this point was a grave architectural mistake, considering that the entrance is so close at hand. In any contemplated remodeling of this area, this stairway would have to be entirely relocated in order to effect a better and more efficient handling of crowds at all times, particularly in the event of an emergency.

starting a new structure; it may even more than compensate the higher costs.

Because reconstructions, as described, amount to almost a new building, they shall not be discussed here any further; the idea of remodeling with its lesser ambition of making the best out of the existing assets shall be the subject to be analyzed in the following points.

After a thorough investigation of all aspects, the plan for remodeling can be shaped up to an optimum of relation between effort and expected results. Compromises will have to be made for reconciling the attainable improvements with economic considerations. Every detail of the intended plan for changes has to be evaluated individually from this point of view. An architect with a special talent for this type of work will often take advantage of given conditions, unfavorable though they may appear at first. Restrictions in free decisions will beget stronger efforts to overcome those limitations, sometimes with surprising results. A deficiency of the old status may turn into an asset of the new one.

Before going into a more concrete analysis of the subject, one main point has to be emphasized: The operation of the theatre has to be well defined, so that the requirements can be definitely established. Vaudeville performance, alternating with screen performance, will necessarily result in a double duty auditorium, compromises concerning angle of view, light distribution, preferred seats regarding their distance from the stage, will have to satisfy the more rigid requirements of the respective type—which means that, for example, all seats with perfect angle of view towards the screen will have the same quality for stage performance, but not in reverse; that the requirement of more brilliant lighting and consequently more elaborate decoration will have to be added to the lesser requirement in this respect for the dimmed-down screen auditorium. The middle section of the orchestra—not too far and not too close to the stage—will be the preferred choice for this type of combined operation. Newly erected theatres of this type (such as the Radio City Music Hall) prove that an ideal solution for such double duty auditoriums of large capacity is beyond reach.

THE PROBLEMS OF REMODELING

In the following an attempt is made to list the variety of special problems which might be involved in a remodeling of an average theatre for predominantly screen operation.

Stage and Backstage

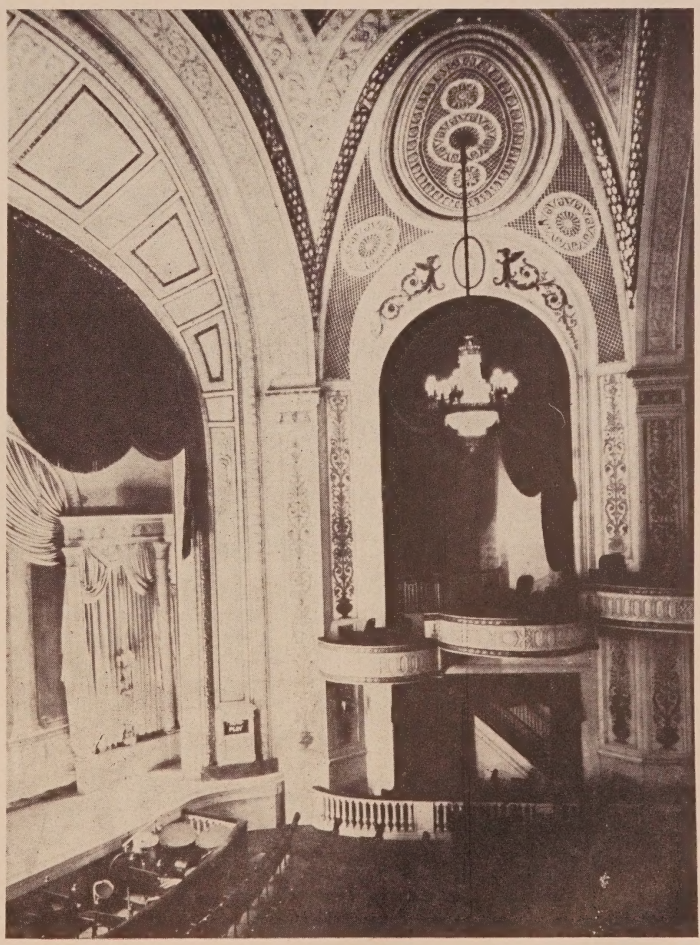
In motion-picture operation, stage and backstage spaces are useless, except for the ten-foot depth necessary for the sound equipment. Because they do not interfere with the operation, they might as well be left alone, considering their occasional use for stage performance or for potential changes of operation and of destination of the building. Trans-Lux operation indicates that future developments may have some additional use for this depth in back of the screen.

Proscenium

The proscenium arch, with boxes on either side, represents usually the show piece of a theatre auditorium. In a motion-picture auditorium, these formerly exclusive seating spaces are rather a liability because of their location on the extreme side and close to the screen. Yet the proscenium is the only conspicuous part, because it is likely to catch some light from the screen. Although care has to be taken that no undesirable reflection is thrown back from these areas onto the screen, the basic structure of the proscenium box openings will favor the treatment as a decorative feature. The boxes themselves are better discarded. Many theatre operators will prefer to use them as potential reservoirs of lesser seats for rush times. This, however, is not a good practice, for the contradiction between their architectural emphasis, associated with their tradition of exclusiveness, and the stigma of being the last choice of a moviegoer is too remindful of obsolescence to be retained any longer. Their presence hurts the prestige of the whole theatre. As a comparative example, a pastry shop when sold out will certainly not sell stale cakes of last week, although some customers may prefer purchasing them to coming home without any.

Naturally there is a variety of methods in which to proceed, dependent on the specific situation and on the adaptability of the box space for other purposes. Just leaving them without using the seats is probably the most conservative approach, although not the best one. Closing their front by a continuous drapery or some other decorative medium is another cautious solution, not affecting the structural part. Ripping out the structure completely or only the parts which extend beyond the proscenium front will facilitate many more solutions for a new treatment of the proscenium.

A TYPICAL PROSCENIUM TREATMENT, with the organ grilles incorporated in the architectural scheme, is shown here. The whole area is broken up into structural members filled with classicistic ornamentation. The boxes patched onto the architecture are almost suggestive of their prospective removal. The space behind could be put to other uses, such as exits. The chandelier, however, has been removed since this photograph was taken.



Besides, the inside spaces and the approaches to the boxes may be advantageously utilized according to prevalent conditions; exit stairs for the front section of the balcony leading to potential exits on both sides of the stage wall, smoking rooms, or refreshment areas for the balcony, etc.

Orchestra Pit and Organ

The distance between the first row and the screen can hardly be utilized except under specific conditions, when exits below the screen might be possible. The orchestra pit can be retained under the same aspects as those mentioned regarding the stage. In this case, it should be hidden by a cover or at least be improved in its appearance. Analogously, the organ—provided it is in working condition —can be retained. The grilles covering the pipes appear usually incorporated in the architectural scheme of the proscenium. The remodeling of this portion will consequently include the shapes and treatment of the organ grilles. Again the decision has to be made whether the organ is worthy even of such minor adjustments or should be discarded altogether.

Orchestra and Balcony

The slopes and seating capacity of the orchestra and balcony are serious points for consideration.

Because the stage performance takes place in three dimensions and on a floor only a few feet above the orchestra, the sloping of orchestra and balcony towards the stage is a requirement which loses much of its point when the planimatrical rectangle of the screen is raised higher. The slope of the orchestra is no more necessary and even undesirable in the front rows. The slope of the rear orchestra may now run over into the horizontal as it approaches the screen or even into a slight counter-rise at the front. The same sort of molded shape is favorable as regards the cross-section; the slightly curved row of seats will gradually rise towards the side walls; the whole orchestra floor takes the shape of a flat bowl.

Because the stage opening allows for a variety of lower and higher stage settings, the balcony front had to be placed so far back that also the last orchestra row would yet receive a perfect view of the whole stage opening. The smaller and permanent size of the screen eases this condition. Recessing the screen into the depth of the stage elongates the paralaxis further. The balcony can now extend further over the orchestra without affecting the view of the back rows. Little or nothing can be done to flatten down the steep balcony floors of theatres and to adjust them to the new angle of view towards the screen. In many theatres, however, it is possible to add three or four rows to the balcony front and these on a lesser slope. Such adaptations have been made before in some theatres with success. The new seats thus installed belong to the preferred sections.

The standing room behind the orchestra seating and usually behind the row of supporting piers is part of the auditorium. The view from there has to be considered in deciding the farthest possible extension of the balcony. A lowering of the standing room floor will improve the situation. The eye of a person standing there should not be considerably higher than the eye level of the last orchestra row.

Second balconies are often so steep that their use involves some dangers, in particular for children and old people. Little can be done, unless the whole construction of the balcony girders, stairs and landings be reconstructed. This will not be worth while in most cases where these seats are sold at lower rates and only as a last resort.

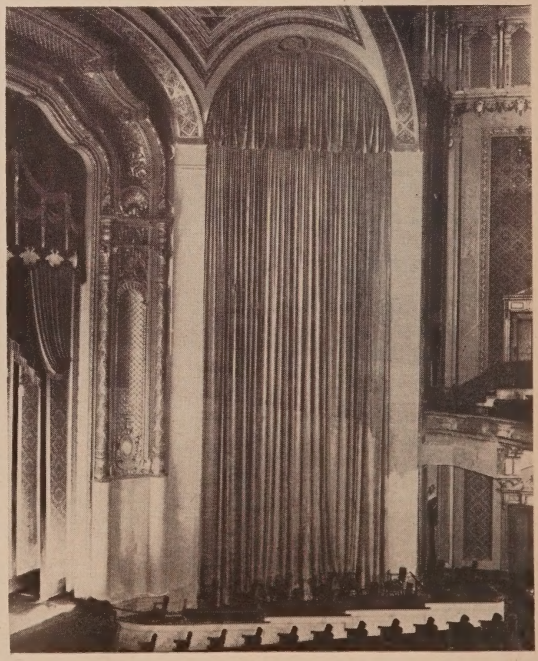
Stairs

Stairs are often found to be inadequate as to their location and construction; at least, those which are not enclosed between walls of a staircase, but are of an open construction, connecting, for example, the orchestra standing room with the balcony foyer, can easily be repaced. Even a change of their location or direction can be made, although the new landing will require structural changes in the ceiling construction and at additional cost.

Seating

Changes in the seating can be made with more ease and independent of structure, and they have been done before in many theatres. The restrictions imposed by safety provisions, incorpor-

A PROSCENIUM WITH EXPOSED ORGAN PIPES (which are, of course, fakes) and a decorative scheme of elaborate detail showing an oriental influence is seen in the illustration at the left. At the right is the same proscenium remodeled by discarding the boxes, ripping out the protruding parts, and covering the whole opening with drapery. Notice the disturbance of "scale" by introducing the long drapery running over all stories into small-scale elaboration of the retained stage frame and wall decorations. The intended effects ask for remodeling of other features to match the newly attuned scale and character of the proscenium.



ated in building codes and fire regulations, require minute consideration of possible solutions, so as to provide the greatest attainable number of perfect seats under given conditions. The length of one continuous row, being limited to 14 seats (seven to each aisle), decides the number of seating blocks. Evidently shorter rows will be less economical as to the amount of traffic-lane area necessary for their access. Yet the usual, irregular shape of orchestras and the converging aisles make it rather difficult to maintain an optimum of layout. The main aisles are preferably unbroken; any break of aisles requires cross traffic lanes which offset by loss of seats the potential advantage of changing the blocks according to the changing width of the orchestra. Besides, such breaks do not facilitate the assigning of seats and the continuous traffic in motion-picture theatres. An odd number of seating blocks will have the advantage of a rectangular center block with parallel aisles on either side, all rows containing 14 seats. This is then the best section of seats. The arrangement with a center aisle does not seem to be as favorable, because it cuts out the most centered seats; on the other hand, it accommodates two blocks, one on either side, at the same time and creates a larger number of more equivalent seats. Also, an even number of blocks leaves the choice of center aisle or center block, because one block may be divided into two half blocks along the side walls with no outside aisles necessary. This arrangement, however, is not possible when the sidewalls—as they usually do—contain several emergency exits and other traffic requirements. The distance between rows is another point in planning the seating. The tendency is toward a more generous space between rows even at the cost of the loss of one or more rows.

Thus, in a given theatre there is a meager selection of ideal arrangements. New theatres are already built in consideration of most efficient seating layout. The planning of traffic and exits has, of course, a definite bearing on this problem. With the disappearance of deep stages, exits below or on both sides of the screen take advantage of otherwise useless areas and do not interfere with the seating layout, provided, of course, that the configuration and location of the building lot favors such a solution.

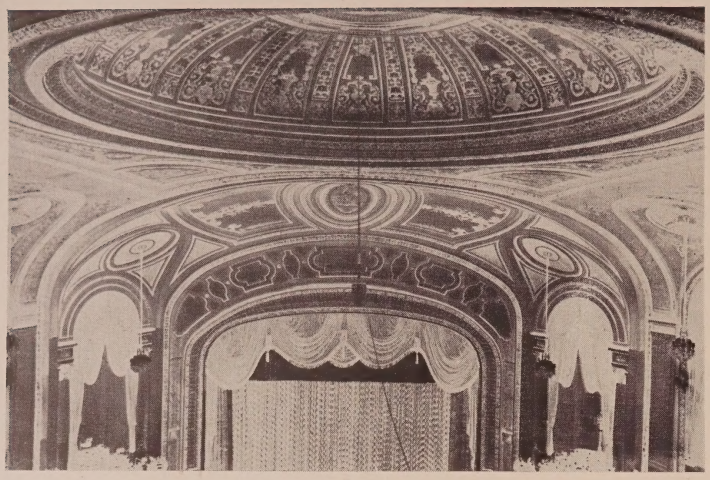
The usual curving of the seat rows is the natural consequence of the general shape of a theatre. The seats facing the center of the stage wall constitute a wider or narrower section of an amphitheatrical plan regardless of the direction of aisles and the exact shape of the enclosing walls. It is evident that, in a motion picture theatre, the angle of this sector should be reduced. The most theoretically adequate shape for a motion-picture theatre is one that is rather narrow and triangular (isosceles), with the screen at the apex of the narrow angle, while that for a stage theatre is like a horseshoe, which consequently, while providing many seats in front and on the extreme sides, would impair by distorted viewing the enjoyment of a screen picture from these seats.

Requirements of Vision

In connection with the seating problem it might be pertinent to say a few words about undesirable distortion of screen image, which is one of the crucial points when the requirements for two-dimensional and three-dimensional shows are compared. Theoretically, the distortion of the screen picture works in all directions. A picture seen from the side will elongate all features, seen from above or in a frog's perspective will shorten them. Practically, the sidewise distortions are the more conspicuous; human visual sensation is more sensitive to them than to the distortion in vertical direction, which it tends to correct by mere experience of vision. The raising of the picture, leveling the slope of the orchestra—as explained before—and reducing the steepness of balconies will avoid too oblique angles of vision in vertical direction. At the same time, it makes possible a reduction of the over-all height of the auditorium.

Sidewise distortion is the more present problem because of its annoyance. It can be avoided only by narrowing the angle of the seating sector, thus reducing the seating capacity. The countermeasure for re-establishing the capacity by utilizing the widening back part of the auditorium is possible only in a new structure. The balcony would benefit equally and even more so from the extra width of the back areas. Even then the configuration of the building lot and the wider span of the ceiling in part of the house may oppose or outrule such a solution. Under all circumstances the attempt should be made to equalize as far as possible all seats as regards the angles of view towards the picture. Not all advantages should be invested in the orchestra as a preferred area. Balcony and orchestra could be assimilated easily

A FOYER CLUTTERED WITH FURNITURE and palm-tree stands is seen here. Less would really be more! The fountain figure would be sufficient a feature. A remodeling could practically create a new modern interior, that would look more like a theatre and less like a museum of fine arts, the while losing none of the pleasing effects that good theatre architecture can easily achieve by modern materials applied in the modern manner.



A TYPICAL DOME OF HUGE DIMENSIONS dominates this whole ceiling. Chandeliers are retained along the side walls. The over-crowded decoration tries to make the scale of the ceiling areas agree with that of the rest of the architecture. The coming of sound motion pictures put an end to this type of architectural embellishment. Such construction is now generally removed from old theatres and not used at all in modern cinemas.

in their desirability by putting screen and approaches, such as lobbies and foyers, half way in between these two levels. Seats in front should have an adequate distance from the screen, preferably about 20 to 25 feet; side seats should not go beyond a line of allowable obliqueness of angle.

Requirements of Sound

Sound in general and sound reflection in particular are two different problems. Although based on the laws of acoustics, the former is taken care of more from experience than by research. It was even more important before when amplifiers of voices were not yet in use. The avoidance of undesirable reflection of sound waves by the enclosing walls was met by the breaking up of continuous wall areas. Heavy stucco relief decoration, fabric panels, velvet fabrics draped for hangings and draperies did the job, besides the audience itself works as a sound absorbing element. With the introduction of acoustic plaster (the rough sound-absorbing treatment for walls and ceilings), there are no more reasons for breaking up large and flat surfaces. In addition, the decorative treatment may include a corrugated or otherwise rough texture of surfaces which will serve the same acoustic purpose.

The disturbance of the audience by outside noises and by noises within the building should be reduced to a minimum. The use of heavy carpeting is almost indispensable and cannot altogether be replaced by rubber flooring. Draperies over doors and large openings served the same purpose for protection against outside noises and light; at the same time, their sound-absorbing qualities were appreciated and they used to fit into the architecture. They have been discarded, or at least reduced, for reasons of safety and maintenance rather than for any other reason; but nothing has as yet been found to replace them in all their functions. Draperies of glass fiber are less sound-absorbent and rather transparent; they improve only the optical appearance and the safety angle. In the planning of new theatres, new methods of breaking up potential soundwaves and their approaches into the interior of the auditorium will do away with such rather primitive devices. For the time being, all sources of disturbance by noise have to be reduced at their sources. The old well-holes, opening the rear orchestra towards the balcony foyers, should be closed without exception. The standing room, usually a place of movement and unrest—in particular with the doors from the foyer standing open—should be separated from the auditorium as far as possible by skirts and beams between the piers, leaving just enough open space for following the performance. This will, at the same time, prevent outside light rays from penetrating the auditorium and onto the screen, a condition which is especially annoying when the center door from the foyer happens to line up with a center aisle running directly towards the screen. The heavy carpets on stairs within the auditorium are a safety hazard; they can safely be replaced by rubber mats or other noiseless floor coverings.

Requirements of Light

There are two main types of light sources needed for motion-picture operation. The one is indirect cove lighting, preferably around the dome, or other indirect light fixtures; this system is supposed to distribute a general diffused light of very low intensity but yet high enough for orientation and safety. The other type is recessed spotlights for highlighting traffic points, steps, and other points of danger. Aisle lights, also, belong in this group. Light from all these sources should hit the floor without touching any wall surface. The experiment of exclusively using spotlights distributed over all ceiling areas was not too successful, because it did not provide sufficient modulation of general light. By comparison, diffused light will allow for variations of desirable intensity, according to changing trends up to full lighting of the house, as required for the intermissions of stage performance. In addition to these two strictly functional types of light sources, there might be other lights for decorative purposes and special effects. Mixed operation, as well, may ask for some additional lights distributed over the auditorium for supplementing the cove lights with the warmth of direct incandescent light waves, the light bulb preferably covered to protect against the glare. So-called black light used on specially treated surfaces serves only a purely decorative purpose for the time being.

In the future, materials with luminous surfaces might revolutionize the field of lighting; a carpet, for example, with luminous qualities, would be very helpful in the orchestra aisles to abolish the need for aisle lights and the large contrasting patterns used in carpets for better visibility. Other luminous materials might do other things.

Colored light is very well adaptable for all sorts of changing effects on walls, and some features are emphasized by modern flood lighting. It is the best way of introducing color in a dark auditorium, particularly when thrown upon surfaces (walls and fabrics) of neutral color.

Motion-picture operation, with continuous performances, has little use for such brilliance of lighting as was provided for the festive character of legitimate operation. Glass chandeliers with glittering reflection have been discarded in most theatre auditoriums for reasons of safety and maintenance; the main chandeliers hanging from the center of the dome have disappeared. Some chandeliers on both sides of the ceiling have been retained more for their decorative appearance than for their function as light fixtures. In lobbies and foyers chandeliers can yet be seen in their somewhat tarnished glory.

Standing rooms require higher light intensity than the rest of the auditorium, as a transition from the bright foyer to the darkness of the auditorium. Old ceiling fixtures and wall brackets have, in most cases, been replaced by "modernistic" fixtures usually not too beautiful in themselves. Their commercial novelty makes the discrepancy of clashing styles the more conspicuous.

Redecoration

Redecorating an old theatre is very much different from decorating a new one for the first time. Once all the symbols of old architecture have been removed, the house will appear naked, revealing its actual proportions—its wall and ceiling areas, arches and openings, its three dimensional space—altogether in their intrinsic architectural qualities. Some theatres may then retain beauty or may even gain in impressive structural balance. Others may fall off completely because of a basically poor concept which

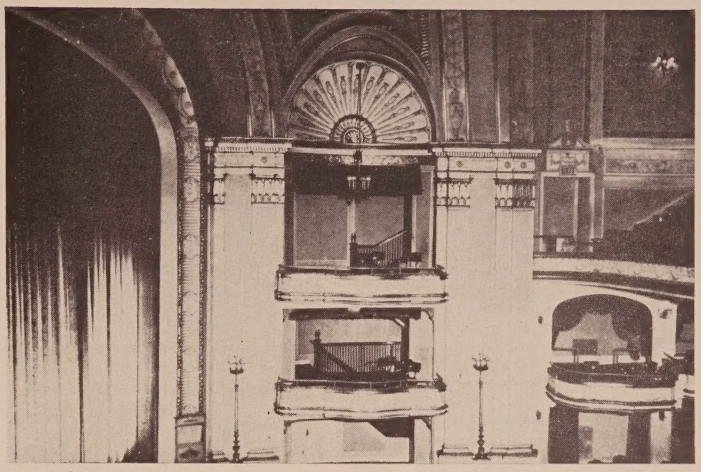
had been concealed by lavish decoration. But all these empty shells, void of the symbolizing system of pilasters, panels, and cornices, will also lack in "scale." All architecture, and interiors in particular, are related to human proportions, as indicated by the size of doors and openings, by height of railings, banisters, steps. These individual features were formerly integrated into the columnar order; consequently, the architectural scheme maintained the relationship with human scale all over the vast area on walls and ceiling. By far not all theatres are beyond criticism regarding their architecture, some of them violating just this rule of scale in many respects. Yet the scale, once attuned by some structural feature such as arches, rails, etc., should remain of major concern also in planning the new interior.

These features are the points from which to start. There is more than one way to go about it. They may be treated in the new scheme as individual features, connected only by some horizontals and leaving large flat areas in between as a neutral background, or they may be re-integrated into a new rhythmical system of layers or network-like pattern. The unbroken surfaces, interrupted only by some perforating features, will be the main characteristic if they were compared with the discarded traditional system that tried to do just the opposite: It dissolved all surfaces into structure and filling, columns or pilasters and panels enclosed by frames. Modern feeling for masses and surfaces is strictly opposed to breaking them up, it also substitutes simple rhythms for the organic symbolism of columnar architecture (flat ornaments and textures for the three dimensional depth of heavy relief decoration).

It is understood that also some of the features to be retained might undergo changes, if one realizes that many of them are pure stucco casts applied to suspended plaster carriers. All former classical decoration pretended genuine structure; the structure itself was concealed by a mere showpiece of a foreign structural scheme.

If a new theatre were built, the modern architect would not only avoid such imitative approach, he would rather strive for an expressive shape and interrelation of actual structural members and would clearly separate them from surface treatment and decor. Decoration limited to flat treatment in color, texture, and surface materials will strengthen the contrast between structure and surfaces, thus being functional in the sense of meeting the purpose of decoration.

In the planning of a remodeling job, it would be unreasonable to strip the house down to the genuine construction. It would not help any, and would destroy the physical value of the theatre. Yet some features might be reconstructed as the case may be. The decoration, however, should try to make the best out of the given hull, to find out its potential beauties, to enhance them without introducing a competing foreign scheme. Only in some desperate cases it might be necessary to substitute such a foreign scheme for the complete absence of structural expression or beauty.



THIS PROSCENIUM OF PLEASANT PROPORTIONS lends itself to remodeling with minor efforts. The box on the upper balcony level will be discarded. Notice the bareness and the exposure of confusing stairrails in the background, after removal of the draperies. A slightly curved wall could fill in, leaving the back space for emergency exits from the balcony. This is an example of a legitimate theatre's inadequacy as a cinema.

IMPORTANT POINTS TO CONSIDER

It is beyond the purpose of this analysis to make any specific suggestions or to go even further in developing certain rules or prescriptions for redecoration. It is the privilege of the artist not to follow strict rules which are likely to interfere with his imagination. With remodelings in particular, every individual case is new and asks for unprecedented decisions.

The following will only recapitulate and supplement certain points to be remembered.

Effectiveness of Decoration

The permanently darkened auditorium limits the means of decoration. Too much detail is, under these conditions, a wasted effort. Only definite shapes and lines will be seen in general, although in certain areas hit by light more elaborate decoration may be justified. In reverse, certain points of interest may be highlighted by special light sources. The light reflected from the screen to the balcony face and proscenium asks for special consideration of treatment. The sensation of color hues is dependent on light: only contrasts of value (dark and light) will penetrate the darkness of the house. These are, therefore, more effective than polychromatic schemes.

Colors have to be of very high chroma (no pastel shades), if they are expected to show up at all. Metallic surfaces of curved shapes, such as gilding of moldings, will reflect some of the yet present light in many directions; it is an effective means of catching the light and using it to outline some important shapes of wall decoration. Colored light, though of low intensity, is a good solution for color effects, with the extra advantage of unlimited flexibility. Black light and luminous surfaces provide new possibilities of decoration. The effectiveness of method should always be kept in mind, for experience proves that, at present, only very few movie-goers receive even temporary impressions of elaborate decoration and polychromatic color scheme.

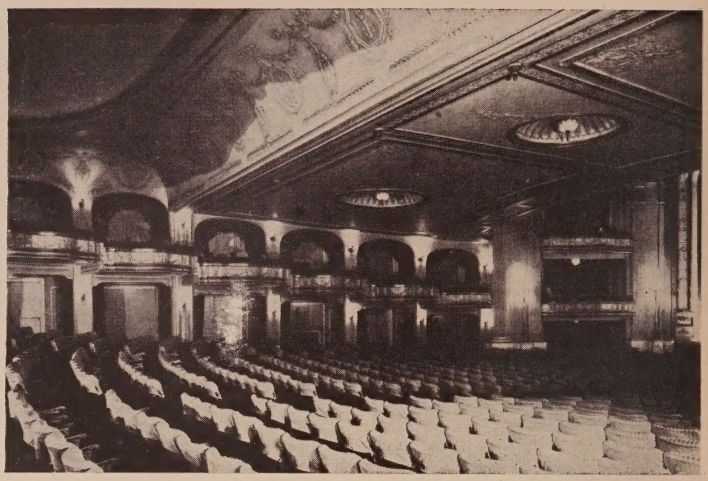
Materials

Materials are structural or textural, natural or man-made; some can be used without limitation of size (plaster), while others have to show seams and joints, because they are limited to measurements. The record of some materials associates them with specific trends; some are prejudiced for this reason. Marble—not only a beautiful material with wide selection of colors and patterns, but also a permanent and useful protection for exposed walls—has lost its credit, because its use has been overdone in the previous academical period, not only in theatres but also in purely utilitarian application. Besides, there is a definite trend against the natural materials in a contemporary ideology which favors the man-made or industrially produced materials.

This preference for metal, glass, and plastics—evident in all fields of design—is accepted for its novelty and progressiveness, but it does not altogether exclude the use of marble and wood, provided they are applied as purely textural sheetings in large unbroken units, flush surfaces, the seams in form of a simple and unobtrusive network of thin lines. Such application relies on the organic pattern of grain as a surface veneer, very much different from its former mixture with structural motifs, such as frames and panels, pilasters and banisters with rich moldings. The new application conforms with the requirement of unbroken surfaces preferably spreading material from floor to ceiling, thus also discarding the traditional paradigm of base, column (carrying wall), and entablature (resting lintel) in the upright development of structure.

Industrial materials excel in large units and in the flawless evenness of surface, yet they lack pattern. In commercial use, patterns are frequently borrowed from the natural materials by all sorts of marbling techniques or even photographic reproduction of woodgrain on the surface. While such imitative practice is not in accord with the idea of honesty and function, there is an important distinction to be made in the application of such tricks. The theatre, as such, belongs among those places where people gather for only a limited period of time. Here they want to be entertained, to be caught by a temporary atmosphere, created by the performance and supported by the environment. This short-living refuge from reality is something different from a home or a living room where objects are to be lived with and should not be reduced to mere stage settings. The stunning effects of unexpected illusions work only for a limited time and soon turn out to be annoyances. In a theatre, on the other hand, just as in restaurants and night clubs, such illusionistic effects can be used to advantage. Yet, because they are not intended for actual and permanent deception, it is smarter to simulate their effect in an unrealistic presentation than to utilize an authentic reproduction. Marbling design can be applied to plaster surfaces by paint in exaggerated proportions, in more colorful combinations than those provided by nature and it does not have to comply with the limitations of genuine marble either as to sizes or seams.

This example brings up the use of paint as a means for decoration. Paint is the least expensive and most versatile surface treatment, providing the best oportunities for the decorator to develop his very personal concept without too serious restrictions. The provision for adjusting the schemes to the prevalent light condition may be seen as such a restriction. Another one has to do with the surfaces exposed to heavy wear.



A TWO-STORY ARRANGEMENT results in (compare with the following picture) pleasant height at the rear of the orchestra, with additional airiness obtained by vaulting. The unbroken areas of the dome and ceiling emphasize the structural features of the auditorium. The mezzanine boxes rimming the rear portion of the auditorium break up the effect of the arches which might otherwise give the impression of too much height.

Paint should be excluded from exposed areas; enamel coating is only a temporary resort and can not be considered a permanent finish. We can safely expect in the near future that new synthetic materials in thin sheetings will be sufficiently scratch-proof for the protection of exposed surfaces.

Structure and Decoration

Decoration should not intrude into structure or indulge in imitative structural detail. Special conditions, of course, will at any time justify exceptions. In general, decoration should have the light character of a surface without taking up too much of structural symbolism. Use of plain colors is the simplest method of creating a background for the structural features, provided these features, such as framed openings of boxes, domes in the ceiling, the curved sweep of the balcony face, are impressive enough to be singled out by this procedure. Networks, stripes in vertical or horizontal direction, division into sections of various shapes or patterns of all kinds have to consider the scale, whether they are executed in paint, in relief, or any other medium. Consistency of scale does not exclude the clever interlacing of different scales in one scheme.

THIS LOW BALCONY SOFFIT (compare with the previous illustration) is divided into styles and panels. Notice the old-fashioned lighting (which, however, has since been removed) and the typical center aisle. While a theatre of probably breath-taking beauty, by the standards of the day in which it was built, present day operation requires a house not only more efficient but one better adapted to showing sound motion pictures.

Flexibility of Schemes and Maintenance

It is evident that the permanent character of monumental architecture, as described before, is out forever. Its lack of flexibility has, in fact, caused all the trouble. The new way of surface decoration will lend itself much better to lesser changes in wake of maintenance and repairs. The ever-growing influence of the fashion of the moment has to be taken into account; with its short-living cycles, it has come to replace long-lasting and more permanent style periods. Maintenance is much more difficult in present operation compared with former conditions. Continuity of performance and large turnover of the audience means heavy wear on seating, carpets, and all exposed surfaces, such as wainscotings, traffic corners, and staircases. Besides, the patrons have changed their conception of the theatre as a place of restricting formality. The management can no more rely on the considerate behavior of the customers, in particular of the younger crowd.

What does that mean in practical terms? Protection of exposed parts by surface materials of satisfactory resistance; unbroken walls avoiding unnecessarily projecting members (such as pilasters) which result in corners and

sharp exposed edges. It further means that managements will have to consider more frequent redecoration so as to keep the theatre in trim and, at the same time, to satisfy the preference of its following for changes just for their own sake. If decoration is handled in the way described, this should not represent a major problem. Changes can vary the treatment of surfaces without disrupting the decorative scheme altogether.

Front, Lobby and Foyers

Front, lobbies, and foyers will necessarily be included in the reshaping of the theatre. Formerly, a sort of climax—from the outside through the outer and inner lobby to the foyer—was supposed to prepare the visitor for the attendance at a performance. This architectural view point has been lost almost completely by the commercial idea of distributive methods. The front and lobbies have changed into display and advertising areas. In present practice, little thought is given to their decorative subordination to any persistent scheme; things are rather done in a haphazard way. Atrocious frames and fixtures, announcements and posters in wild colors obliterate the old marble architectures with vulgar cheapness. Over-bright lights guide the eyes to all unpleasant details and clashing inconsistencies. If some of the care department stores use in display and on the approaches to the selling areas would be given to those arcade-like traffic areas, they would look very much different from what they usually do. The fact that they have been taken away—in most instances, at least—from the architect's concern is the explanation, but certainly it is no excuse for their cluttered appearance. A thorough planning by the designer will have to give them a basically new treatment, according to their importance. To begin with, the posters and announcements themselves should be raised to a higher level of design, but that is not enough. The progressive idea of display includes the whole setting in a new concept of "Visual Selling." The same principle has to be applied in remodeling the front and the lobbies.

In some theatres the lobby has been remodeled; but this has not gone far enough in incorporating display and advertising into the new scheme. Theatre fronts above the marquee are hopelessly neglected; this should be another valuable display area of which advantage is not yet taken, except for temporary billboard constructions with huge posters for special shows. Instead of all these improvisations, new ideas will come to be presented and could well be applied to remodelings.

The foyer has now the more important duty of inserting a restful place in between the turmoil of the lobby and the comparative silence and darkness of the auditorium. The catching of the visitor's attention and the absorbing of his interests by advertising should now change into an atmosphere of composing restfulness. This purpose will have to be expressed and furthered by a more intimate setting, moderate lighting, dignified and not too fancy decoration, heavy carpeting, all of them serving the purpose of repose and expectation. Candy-bars, fountains, approaches to restrooms have to be integrated into the scheme from its beginning.

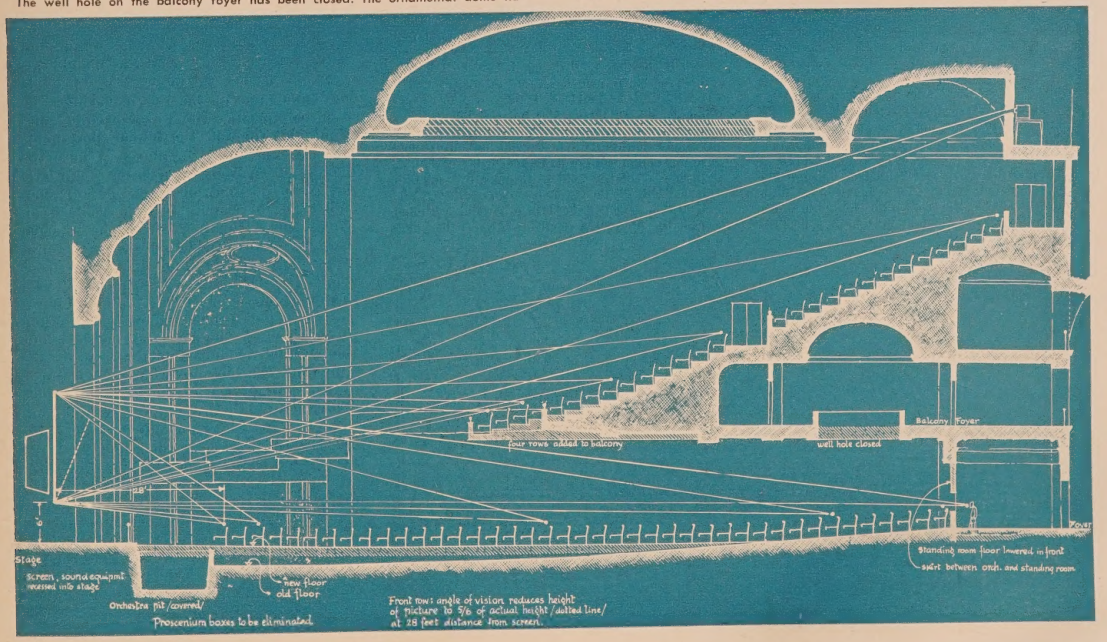
Objects of Art

In general, the theatre is not the place for displaying works of the Fine Arts. In particular, they should never be put in places of traffic or places where they meet the competition of advertisements. Thus, the lobbies are definitely excluded. The foyer's specific atmosphere and layout may justify sculpture, for example, even as a main feature. Art should at any time be a main feature whenever it is brought into its right place. Pictorial murals as well should not be done just to cover an empty wall. If the subject is not directly pertinent to the specific case, the often-occurring allegorical themes are only a poor substitute. This and other old-fashioned types of subjects have little hold on the interests of the public and certainly not on motion picture fans. Abstract designs, of artistic level of course, and photographic murals are probably less pretentious and more suitable for the purpose.

CONCLUSION

The coming years will prove that remodelings should be done in a broad-minded spirit. Let us not destroy the assets of an auditorium just for a change, but discard all features which may be too mindful of the old, outworn splendor. A certain amount of conservatism is perfectly all right, but it is unavoidable that a new, unprecedented type of work will ask for some progressiveness in the attitude of managements and some freedom for the architect or designer in exploring a new field.

AN OBSOLETE AUDITORIUM IS REMODELED as suggested. In this longitudinal sketch, Professor Sobotka shows how an old-style theatre may be done over. A new floor is laid, to permit more rows of seats and to eliminate the orchestra pit. The well hole on the balcony foyer has been closed. The ornamental dome has been closed off. And four rows have been added to the balcony, without disturbing the line of sight from even the standees. In the text, Professor Sobotka discusses these changes and the reasons for making them, as well as taking up such other considerations as what to do with prosceniums, useless boxes, etc.



An Introduction to the Knowledge of Roofs

Covering, Flashing, Drainage of Roofs Are Three Important Details to Consider

By J. D. STEBBINS

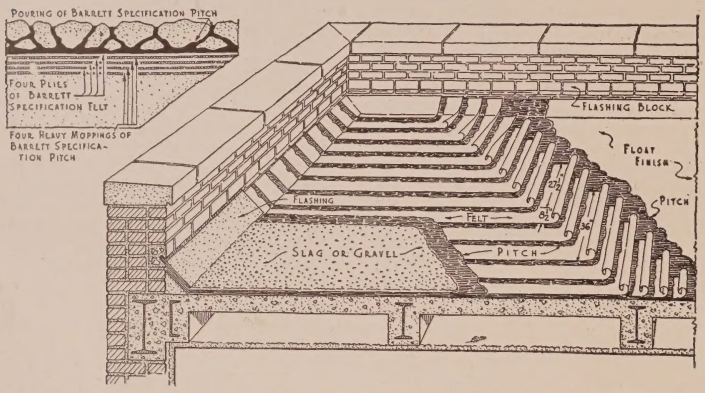
The Barrett Division, Allied Chemical and Dye Corporation

Know your roof. Many a theatre owner does not know he has one until it leaks. The roof is an important part of your plant and needs your attention and care. Do not wait until the water is running down your patrons' necks or the plaster starts peeling from the ceiling. Remember the old saying, "A stitch in time."

ROOFS IN GENERAL

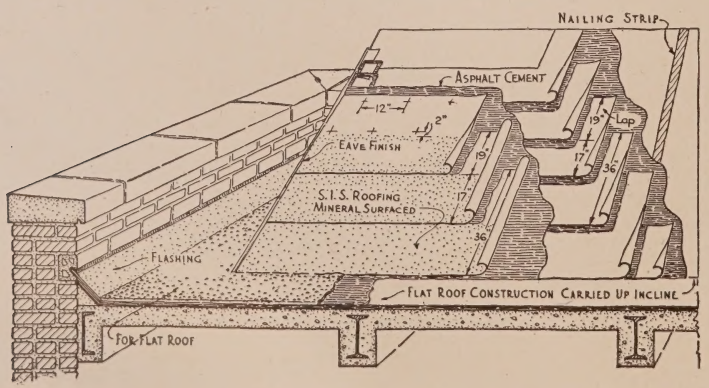
Roofs, which give no trouble or need no repairs, start on the drafting board in the architect's office. The roof structure should be so designed as to allow for the application of a water-proof covering which will give the longest life. Everything in connection with the selection of the roof and its application should be carefully considered and detailed, in order to insure proper functioning and freedom from annoying and costly repair expense. Material used in the roof covering should be selected to meet the detailed requirements of the job. The roofing contractor should be chosen for his skill and responsibility and for his general experience with the particular type of work involved. Finally, you should insist on securing a satisfactory guarantee covering maintenance of the job.

If your building is designed for a flat roof, you are fortunate. The more complicated the roof, with flat and steep surfaces adjoining—or the more the roof is cluttered up with unnecessary structures—the more difficult it will be to keep it tight. Keep your roof as simple as possible—keep it free of projections or appurtenances that serve no useful purpose. Keep it clean and free of foreign or loose material.



FOR FLAT ROOFS (above), or on those with an incline not exceeding 2 inches to 1 foot, this drawing gives the suggested construction plan of the Barrett Division of the Allied Chemical and Dye Corporation. To be used over a deck of poured concrete or gypsum, Type AA is of 4-ply construction, and, when installed according to the company's specifications, carries a 20-year guarantee. Over the roof deck which has been rid of dirt and loose material, and when dry, smooth, and firm, a "binder" layer of pitch is placed, and then four plies of felt are laid down, on top of each going a mopping of pitch, and over all, a final layer of pitch into which gravel or slag, from ¼ to ⅝ inch in size, is embedded.

FOR STEEP ROOFS (below), on those with inclines over 3 inches, but not exceeding 9 inches, to 1 foot, this drawing shows the method of construction suggested by the Barrett Division. It may be laid over a deck of either poured concrete or gypsum. First, the surface of the roof deck is given a priming coat, which is allowed to dry for not less than 6 hours before the application of the actual roofing. Then the entire surface is coated with asphalt roofing. Then the entire surface is coated with asphalt or S. I. S. cement. For cold application, two plies of 15-pound felt are laid over the entire surface of the roof at right angles to the incline. A coating of S.I.S. cement is, of course, applied between the plies.



ROOF COVERING

The probabilities are that your roof is —or will be—of the built-up type. Most roofing of this type is built of either asphalt or coal-tar products, or both. It is well to know the difference between the two and where the use of each is indicated. Non-technically, asphalt is derived from the distillation of petroleum and is principally produced by the oil refineries. Coal-tar pitch is obtained from the distillation of coal-tar, which is a by-product in the coking of bituminous coal.

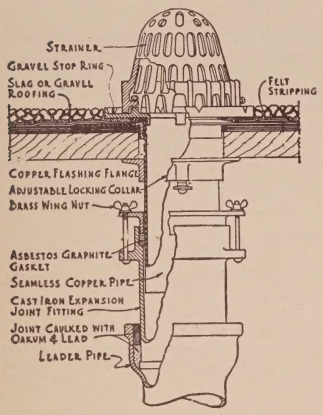
In the application of roofs on flat or nearly flat surfaces, coal-tar pitch and felt saturated with coal-tar should always be used. Combined, they provide the membrane of the roof covering—the pitch comprising the water-proofing element and the felt the binder that holds the water-proofing in place. Where the incline of a roof is greater than two inches to the foot, either asphalt or special types of roofing pitch may be used. In all cases the roof should be finished with a top protective surfacing of mineral. Crushed slag or gravel is most commonly used on flat areas, and mineral granules on steep areas. The mineral surfacing has a most important function in preserving the roof. It screens out the actinic—or ultraviolet—rays of the sun and thereby prevents or retards drying out of the bitumen. It provides protection against flying embers and generally serves the same purpose as paint on structural steel. All standard roofs are tested by the National Board of Fire Underwriters. Fire ratings, designated as "A," "B," or "C," are given to these roof coverings, based on their ability to resist the spread of fire. Before selecting a roof, it is well to check with the roofer, or carrier of your fire insurance, to be sure that the roof does not interfere with your obtaining the lowest available rate.

ROOF FLASHING

Be sure to check all roof flashings. They too should be properly designed and installed, and should be guaranteed along with the roofing. Most weaknesses usually show up in flashings or at the flashing line. Inasmuch as flashings are exposed to the same conditions as the roof covering itself, they should be built to last just as long, and should receive proper attention after they have been installed.

ROOF DRAINAGE

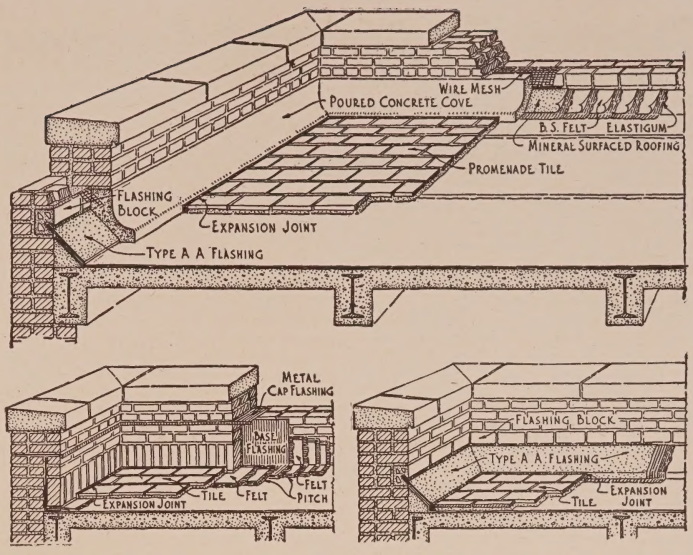
The matter of roof drainage should also receive your attention. Roof drains are provided to carry the water away from the roof. The roof drain head or connection is a device that connects the roof or roofing to the interior drainage system. The drain head performs a very important function because it protects the building at the point where the flow of water is the greatest. These heads should be of heavy cast iron and should be equipped with a large strainer and a metal flashing flange to prevent stoppage of the drain and allow for proper connection to the roofing. You should never permit your roof drains to become obstructed with foreign matter, such as leaves or other loose material which accumulate on the roof. It is well to provide a factor of safety either in the form of additional drains or in the form of scuppers which are inserted in and through parapet walls near the low point of the roof and about two inches below the top of the base flashing.



THE DRAINAGE SYSTEM of roofs is important. Here is a sectional diagram of the Barrett-Holt roof connection, Type 1-LG, designed for use on flat roofs.

SUMMARY

These three things, then, are important: First, the roof covering; second, the flashings which connect them to parapet walls and other vertical surfaces; and, third, the roof drainage system. These elements are only as good in service as their adaptability to the particular conditions involved, and to the care and skill with which they are applied or installed. Good roofs are the result of the use of the proper materials of high quality, applied according to approved specifications or methods, by workmen who know their business Wherever possible, bids for new roofs should be based on complete specifications prepared by an architect or other equally competent person. This will provide a definite basis for getting what you pay for—if you will insist on the specifications being followed. By requiring a guarantee—or bond—by a reputable roofing contractor or roofing manufacturer, you will secure proper inspection before, during and after the application, and you will have a responsible guarantor to fall back on when and if you need him.



THREE TYPES OF FLASHING are shown in these Barrett Division drawings. At the top is the concealed Type AA, with a special block covering the actual flashing. Lower left is the concealed metal flashing, and lower right shows the exposed Type AA flashing. Regardless of the type that is used on theatre roofs, it is highly important that it be installed properly—and covered by the guarantee theatre owners receive from the builder.

Several of the large theatre chains have their roofs inspected regularly by their maintenance superintendents. They require a signed statement from the superintendent—countersigned by the local manager—that the roofs are free from rubbish, that all roof drains are clear and working, and that there are no leaks. This is a good system and one you might use on your theatre. It will constantly remind your local manager and your maintenance man of their responsibility in relieving you of roof troubles.

GENERAL METHOD OF APPLICATION of a built-up roof membrane is shown in this photograph from the Barrett Division of the Allied Chemical and Dye Corporation. Over each successive layer of tarred felt, pitch heated to not less than 400 degrees is poured at the rate of 200 pounds to each 100 square feet. After the final felt ply is laid, embedded in each 100 square feet are 400 pounds of gravel or 300 pounds of slag.

Theatre Design and Construction in Mexico

Architect Tells about Building Activity And Some Special Problems Met and Solved

By FRANCISCO JOSE SERRANO

Engineer and Architect

The construction of theatres in the City of Mexico from 1930 to the present has kept pace with the rapid expansion of the city's population from 500,000 to 2,000,000 inhabitants.

Many important theatres, such as the Alameda, the Palacio Chino, the Metropolitan, the Encanto, the Teresa, and the Chapultepec, with a capacity of from 3,000 to 4,000 and a cost of up to 3,000,000 pesos, have been completed in this time. At the moment, the Latino, the Cosmos, the Opera, the Plaza, and three other yet unnamed theatres are under construction. These theatres have a capacity ranging from 3,000 to 5,000 persons and have a cost up to 7,000,000 pesos.

MEXICO: REPUBLIC AND CITY

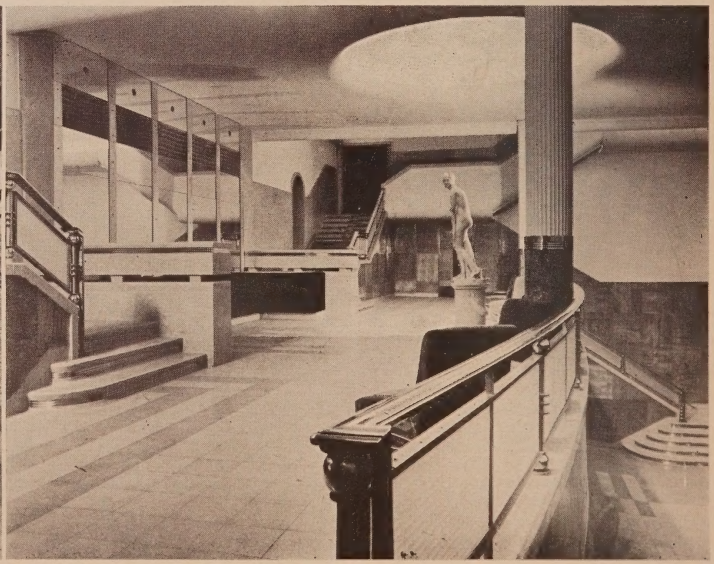
The City of Mexico, contrary to popular belief, has a temperate climate tending toward the cold. The average temperature ranges between 13 and 19 degrees Centigrade (56 to 68 degrees Fahrenheit), and suffers enormous variations during the course of the day, sometimes registering changes of as much as 50 degrees F. The mornings are cold. The mid-day is hot, due to the great intensity of the tropic sun, and the evenings and nights are cool to cold. Pines and palms grow together, and there are flowers all year round. Often in December roses are blooming under leafless trees. Although it never—or only every 20 or 30 years!—snows in the city, the peaks of the volcanoes that tower over the capital are perpetually covered with snow and ice.

One might say that the climate of Mexico was "air-conditioned by nature," for as summer comes on, in May, the northeast winds bring in moisture from the Gulf Stream in the Gulf of Mexico, and when this moisture meets the cold atmosphere of the Sierra, dense clouds are formed, tempering the heat of the sun and producing a long rainy season, lasting from May to September. During this season it rains almost every afternoon and the freshness of the rain relieves the intense heat of the morning sun. As winter supplants summer, the heavy clouds begin to disappear, giving way to a bright sun that does much to modify the cold, especially in those places with a southern, eastern, or western exposure. These places can always count on solar calefaction. Solar heaters often heat bath water to a temperature of 124 degrees F. after only two hours of sun in the dead of winter. And there is always sun.

PROBLEM IN AIR CONDITIONING

Mexico City is at an altitude of 8,000 feet above sea level and the mountain air, the relative humidity of which is very low (15 to 50 per cent), has been made the most of in the use of evaporative cooling systems for theatres. During the construction of the Cine Teresa, an acute shortage of electric power made the use of mechanical-electric refrigeration impossible. At that time, a plan was presented for cooling the air by canalizing it through air washers containing water at a temperature of 13 to 15 degrees C. (56 to 59 degrees F.) to modify the heat produced by an audience of 3,500 persons, the only charge of heat that would need to be reduced. It was discovered, however, that it would be necessary to introduce a minimum of 100,000 cubic feet of air per minute, an excessive amount for a small, mid-week audience. Due to this discovery, a plan was worked out through the cooperation of two engineers, E. N. MacKinney, of the Sturtevant company, and Calvin Barnes, by which the flow of air could be modified. This was to be accomplished by means of radial swing dampers placed at the mouth of

THE CINE TERESA is distinguished by the absence of decoration in the sense that the United States theatreman uses the term. At the left is seen one of the stairways to the balcony, with the granite risers protected with bronze fronts. The wall paneling is also notable. At the right is the mezzanine foyer, on which level are located the men's room (beyond the arch, left background) and the ladies' room (at a comparable spot at the left). Note the absence of obvious fabrics and the accent on marble and granite. The statue adds a touch of classicism, carried out further in the proscenium decoration of Muses and Graces.



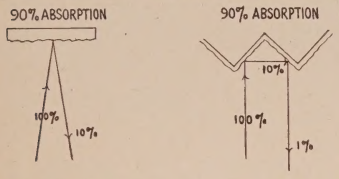
the suction ventilator by means of a thermostat placed in the return duct. This thermostat, working through a system of compressed air, gradually opens or closes the swing dampers in a manner designed to keep an even temperature.

We might say, accordingly, that this air-conditioning system "feels" the presence of the public and gives the audience a quantity of air in keeping with its size, for the increased temperature in the return duct causes the dampers to open wider, and a decrease in temperature caused by a smaller audience causes the adjuster to shut.

PROBLEMS IN ACOUSTICS

Another interesting experience during the construction of the Teresa had to do with acoustics. Despite the fact that the wall at the back of the theatre was covered with an acoustic absorption material boasting a 90 per cent absorption coefficient, a feeble echo was clearly discernible in the first few rows of seats, those nearest the screen. The owners postponed the imminent opening date until the echo could be eliminated.

All possible methods of avoiding the echo were tried, unsuccessfully, until at



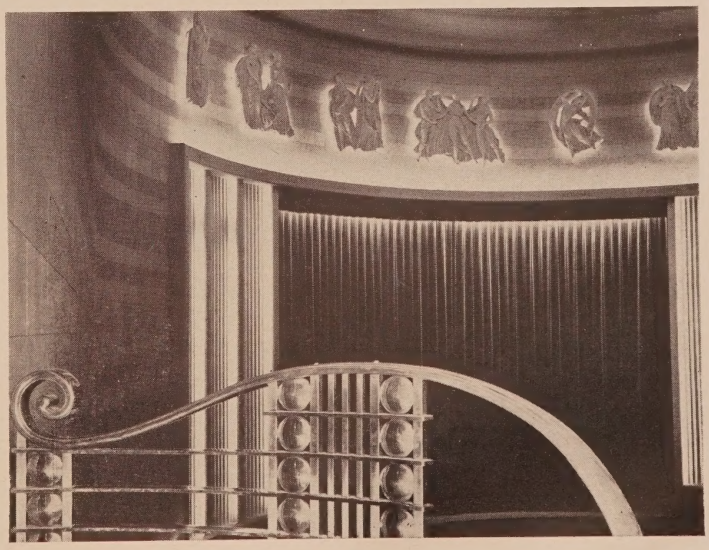
ONE STRIKE TWO STRIKES

last, through the cooperation of Guillermo Debus, manager of the Western Electric Company of Mexico, and his "acoustic gun," the seat of the trouble was discovered.

The "acoustic gun" consists of a tube whose frequency is in accordance to that of a microphone fixed to one end, in such a way that it produces a thin beam of sound which causes a greater or lesser reflection when the microphone is pointed toward the places from which the sound strikes. This reflection in turn is captured by a two-sided microphone, situated in the place where the echo was heard. Through the use of this gun it was observed that the echo diminished when the apparatus was turned toward the curtains covering the entrances to the theatres, but increased when the apparatus was turned towards the wall . despite the fact that they were covered, as previously stated, with a 90 per cent sound-absorbing material.

Through the use of curtains and padding, the echo was eliminated, but these hangings completely undid the effect of the interior decoration. It was then that the solution was discovered. The acoustic material was placed in angles of 90 degrees, at the back of the theatre hall, thus obtaining the complete disappearance of the echo, since the sound wave had to strike twice against the acoustic material, losing 90 per cent of its force two times before returning to the place where the echo had been objectionable. In other words, instead of returning 10 per cent of the sound force after one contact with the absorbent ma-

THE CINE TERESA in Mexico, D.F., some of the problems involved in the renovation of which are discussed in this article, has become one of the Mexican capital's top motion-picture theatres. That owners Arturo Ceballos and Julio Castro selected the right man in Francisco J. Serrano as the architect is apparent from these pictures. The proscenium of the Cine Teresa, as viewed through the bronze stop on top of the balcony front, reveals a simplicity accentuated by the classic figures of the Three Graces and the Nine Muses, so befitting the house.



THE PROJECTION ROOM OF THE CINE TERESA is set into the fore part of the balcony, thus providing a light-throw from the Peerless Magnarcs perpendicular to the screen, which is itself at right angle to the stage. It will be noted that, with the booth in this position, the viewing angle at any place in the balcony is virtually equal to a comparable position on the auditorium floor. At the right is seen one of the rear auditorium salidas (exits), flanked by back-lighted glass blocks. The linear lighting scheme under the balcony clearly lights the aisles without interfering with the enjoyment by the patron of the screen program.

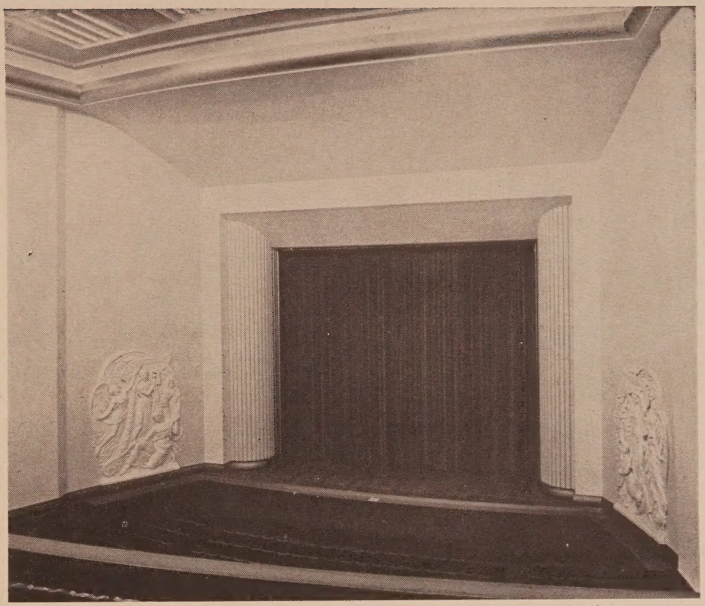
terial, one per cent of the original sound force was left after two contacts. Naturally the echo was imperceptible.

SUMMATION

Many other details, characteristic of Mexico, such as the interlocking of sheets of roofing, the use of indirect lighting on the steps, etc., might be mentioned, but it would be an abuse of the attention of the reader. Suffice for the moment what has here been said to demonstrate the interest shown in Mexico in the construction of modern and attractive theatres built, as one might say, on the crust of an ancient lake with the nearest rock strata 600 feet below the city and the intervening layers containing as much as 80 per cent of water. But it will be better to make the narration of these details wait on the completion of the new theatres now under construction.

THE TROCADERO THEATRE, in Montevideo, Uruguay, is said to be one of the finest theatres in the whole Western Hemisphere. From the striking front, (right) essentially marqueeless, through the spacious lobby (left), finished in highly polished marble, to the auditorium of stark simplicity, Architect Rafael Ruano has created for Jose Brunet a theatre which should prove not only a mecca for Montevideans but a source of inspiration to theatre designers of the United States and other countries. Without detracting from the effectiveness of the theatre, everything about it accentuates the purpose of the structure—entertainment.

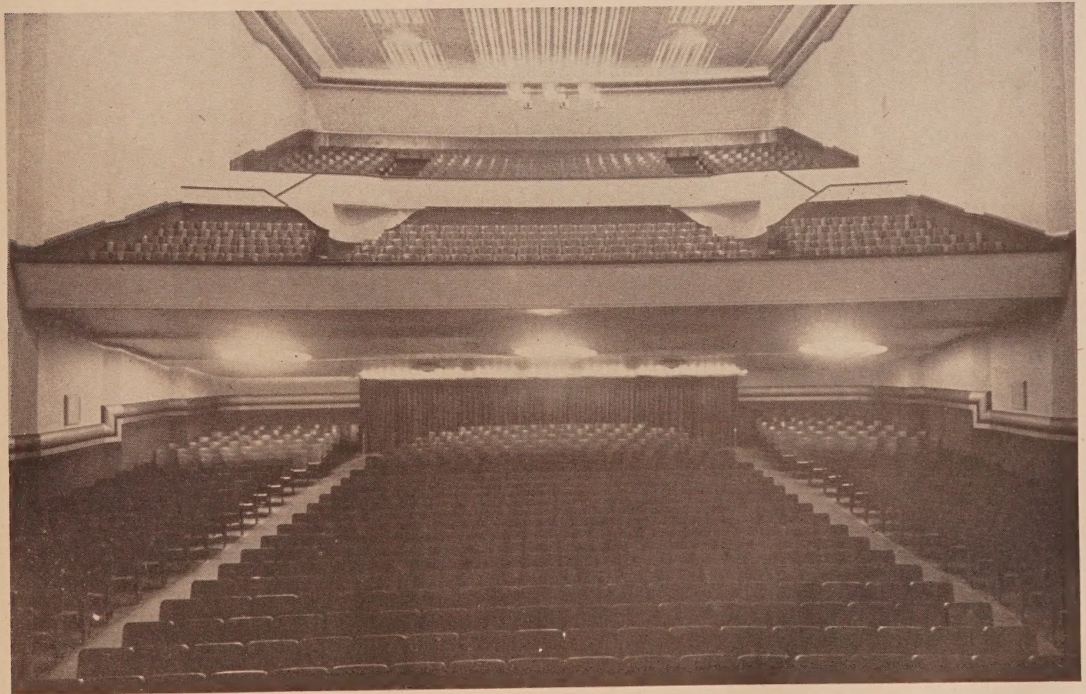
A SINGLE SCULPTURED PLAQUE adorns the Trocadero Theatre's side walls. Shown here in close-up is the one on the left (above) and the one on the right (below). Both are the work of Giammarchi, Berandi, and Lopes, who also did the other decoration.



THE AUDITORIUM OF THE TROCADERO THEATRE is indeed noteworthy because of its utter unpretentiousness. While it is not indicated, it can be presumed that Architect Rafael Ruano has utilized to the utmost lights in his decoration scheme. The plaques add the ultimate touch in superb simplicity. The proscenium is, indeed notable for what was not done, such as the lack of capitals on the columns. Air conditioning is by Westinghouse.

THE TROCADERO THEATRE carries its rich simplicity even into the rear portion of the auditorium. The marble stairs and walls were executed by Laviere Vitasa and Sons, with the acoustical treatments by L. Rios and L. Garcia Pardo, and the parquets by Diaz Brothers and Perez. Barosi Brothers furnished the chairs.

In the auditorium as seen here, the modern touch of theatricalism comes in the ceiling lighting which is from tubular sources in linear arrangement. Another unusual feature is a seating plan which provides for flaring aisle heads, to facilitate, even at the loss of some seats, use of the vomitory areas.



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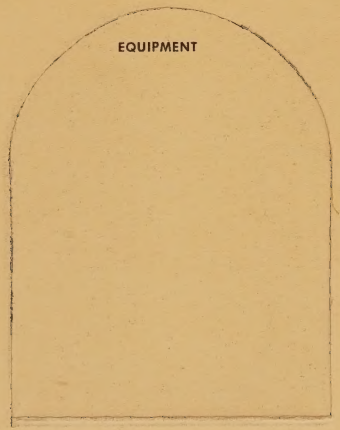

THUMB DEX
Patent No. 1579575

SECTION 2-A
FRONT and LOBBY
PAN-PACIFIC
THEATRE
ROBERT TAYLOR
WALTER PIDGEON
"FLIGHT COMMAND"
"MADE FOR EACH OTHER"
JAMES STEWART
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ICE CAPADES NOW
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Porcelain Enamel in Tomorrow's Theatre

Colors and Shapes in Enameled Sheet Metal Permanently Accentuate Architect's Design

In perhaps no other type of commercial building is permanent, colorful beauty as important to success as in theatres. And no other construction material provides these qualities to the same degree as does porcelain enamel. With this versatile material, the architect and designer creates in permanent form the expression of his art. Colors, designs, and shapes are employed as he wishes, to achieve his desired effects. Colors can be employed lavishly or with restraint, and in sweeping designs or plain effects. From the design standpoint, porcelain enamel gives all the freedom one could wish.

By EDWARD MACKASEK
Manager Director, Porcelain Enamel Institute

Considering porcelain enamel as an investment, its use affords welcome economies in original cost and maintenance. Due to its wholly inorganic character, porcelain enamel resists the destructive effects of corrosive, smoky atmospheres, sunlight, rain, cold and heat. It is truly the lifetime finish that retains its original brilliance and beauty long after ordinary materials have become dull and dingy.

IN INTERIOR DECORATION, porcelain has its uses, too, for the theatre, as is indicated by this photograph of the Porcelain Enamel Institute, Inc. These panels were designed and executed by Edward Winter, artist of Cleveland. Besides obvious uses in lounges and rest rooms, decorative porcelain enamel of this type might well find additional employment in cryrooms and nurseries, and other places where ease of cleaning is advantageous.

INFINITE RANGE OF COLORS

When it comes to producing a variety of colors, porcelain enamel has a practically infinite range. Furthermore, the matching of distinct and delicate shades in porcelain enamel is readily accomplished. This is a very vital consideration with those who want to establish a distinctive effect. If you do not use porcelain enamel, you are obliged to choose a color from a limited selection of stock shades.

But numerical superiority in the number of colors that you can produce in porcelain enamel is not the only color advantage it possesses. You are not restricted to large masses or areas of solid color, which sometimes may produce a visual monotony. With porcelain enamel you can work out multi-colored designs of any required degree of intricacy. Furthermore, this can be done at relatively low cost. Development and improvement of the new technique of porcelain enamel painting now permit of gorgeous color effects, including finely detailed pictorial work and murals heretofore impossible, even in porcelain enamel. Here is a medium for artistic expression so new that its limits in the architectural field have not been touched.

DISTINCTIVE FORMS

Designs in the modern trend include many curves — frequently sweeping curves. In that, architectural designers are moving away from the extensive flat surfaces which were widely used in prewar days. This construction lacked those elements of design that make it possible to produce the distinctive variations that are especially needed in many types of structures. Commercial buildings, for example, were apt to be very much alike with the exception, possibly, of color and a few minor details. Now porcelain enamel offers the architect a material which can be made in all the different forms in which sheet metal can be fabricated. With all these pleasing shapes he can do things he needs to do to create distinction—and with it he combines the great strength that is the prime attribute of metal.

Then again, the strength and workability of the metal base permits greater design and structural flexibility. Your architect can study the elevation of the building and decide where the joint lines might best be placed to harmonize the lines of the structure. He is not forced to break up the surface into a large number of small sections. With porcelain enamel it is possible to make large sections, in some cases up to 8 or 10 feet long. In some instances, this is an important element in design consideration.

THE J. P. HARRIS THEATRE reveals another advantage of porcelain enamel as a front material. As is shown in this Porcelain Enamel Institute photograph, the contrast of the old and the new are striking.

PORCELAIN ENAMEL is set in place in panels, with the lines of contact more or less noticeable. While a perfect construction job minimizes the effect, many designers are, as is shown here, so designing the paneling that the breaks form a natural part of the design. According to the Porcelain Enamel Institute, a cream-colored finish is accentuated with a trim of black, making for a striking, and unifying, appearance to this block.

OWNER AND USER ADVANTAGES

In common with other structural materials porcelain enamel has its limitations which must be recognized in planning for its use, and to obtain the maximum of service from it.

Those manufacturers who have had the most experience with the development of architectural porcelain enamel know that the major problem involved in this work is not the task of turning out the required amount of porcelain enamel parts. The great responsibility is in the engineering phases, such as proper dimensioning and detailing, careful erection and close supervision, to the end that the finished job will be acceptable to the buyer and architect, and a credit to the industry. In order to educate the porcelain enameler to these facts, and to protect and promote the interests of this part of our industry the manufacturers engaged in it are forming a separate Architectural Group, within the Porcelain Enamel Institute. It is an objective of this body to set up manufacturing and performance standards.

The greatest progress in the development of sales structures has been achieved in theatre design. A theatre symbolizes to most people the idea of relaxation, enjoyment, comfort and beauty. To promote this atmosphere theatre management has gone to long lengths to provide luxurious appointments in the way of lobbies, rest rooms, ornate interiors, etc. It is essential that this same atmosphere of luxury be re-

REPRESENTATIVE OF MANY THEATRE FRONTS created out of porcelain enamel are these two, photographs of which were provided by the Porcelain Enamel Institute. With the Berkley Theatre, porcelain enamel is used strictly as a facade material, with the back portions of the theatre structure of brick construction. With the Dearborn Theatre, a more expansive use is made of porcelain enamel, with practically all exterior portions of the theatre coming into the public's line of vision being faced with this material. This theatre also indicates that, with the proper design, no space is too expansive to preclude possible use of porcelain.

METHOD OF PLACING PORCELAIN ENAMEL is, because of the lightness of the material, rather easy—yet, of course, it must, as is shown in this Porcelain Enamel Institute picture, be set by men skilled in the work if the best results are to be obtained. When properly attached to the background structure, porcelain enamel will not flake off or become loosened by the strains produced by wide ranges of temperature that may be encountered.

flected in some manner in an exterior that will create a similar impression. Ordinary building materials lack the elements necessary to provide such a front, that is why theatre architects are more and more turning toward porcelain enamel to give them the required latitude in design.

SUMMARY

Porcelain enamel offers the architect the following advantages:

Porcelain enamel is permanent. Regardless of the shade or color the architect may select, whether it be a delicate pastel or a deep opaque, in porcelain enamel it is permanent. Porcelain enamel has an inherent resistance to the destructive agencies in the atmosphere. Even in the smoky and acid-ladened air of industrial centers porcelain enamel will retain its brilliancy and color.

The effectiveness of color as a sales potential can only be maintained if it is kept clean. Porcelain enamel eliminates costly maintenance. It can be kept clean constantly by means of the simple expedient of using a damp cloth, soap and water. Porcelain enamel structures after years of service remain fresh and new.

Porcelain enamel is light, quickly erected, and positively attached to the background structure. Porcelain enamel will not flake off or become loosened by the strains produced by wide ranges of temperatures. A porcelain enamel construction is a safe construction.

Porcelain enamel is fireproof. There are many examples of porcelain enamel structures going through disastrous fires that have reduced the other components of the building construction to charred ashes yet the porcelain enamel surfaces were not affected by the same heat.

With all the advantages porcelain enamel offers to the designer, it is, nevertheless, economical in first cost. If its cost is compared with the number of years it will serve, it is by far the lowest cost veneer that is available.

IMMUNITY TO FIRE is but one of the advantages of this material, according to the Porcelain Enamel Institute. There are many examples of poreclain enamel structures going through disastrous fires, which have reduced other components of the building construction to charred ashes, yet the porcelain enamel surfaces were not affected by the heat. What dirt and smudge collected was easily removable. In this PEI picture, note well the fire damage to the structure at the right and the obvious wrecking of the electric sign at the left—yet, the porcelain enamel front of the filling station retained its pristine gleam.

Suggestions on the Maintenance of Signs

Signwork, to Pay Advertising Dividends, Must Be Treated Like a Valued Investment

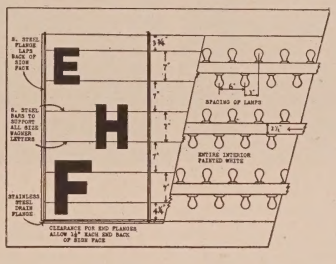
By Erwin Wagner
President, Wagner Sign Service, Inc.

A large part of every advertising dollar goes to pay for space. This is true in practically every form of advertising. Since, in the case of every theatre, the most effective advertising space already belongs to the theatre, the best possible sign and marquee are neither too good nor too costly.

In attempting to "chisel" down the cost of a sign or marquee, it should be borne in mind that great flexibility in designing this equipment is possible—but you only get that for which you actually pay. A "cheap" front is invariably costly in that it does not take full advantage of the prevailing possibilities and, furthermore, necessitates maintenance and repair costs out of all proportion to the original cost.

The life of a changeable-letter sign, properly painted and maintained, would be at least twice that of one not properly painted and maintained, and the same would be true of an upright sign. However, the life of the sign is relatively unimportant, because a sign which is not properly maintained is practically worthless and devoid of any real advertising value.

FIGURE 1.—Diagram showing the method of staggering the lamps for the proper illumination of sign letters by incandescent bulbs. The lamps, for best effects, should be mounted on 6-inch centers.



ILLUMINATION

In designing the changeable letter portion of marquee display boards, many theatres fail to obtain the best possible results. It should be remembered that good lighting is essential to the advertising efficiency of the marquee. While a sign man can cut corners by installing fewer sockets, and seemingly obtain sufficient illumination, in the final analysis it is much more desirable to have sufficient lamps inside the board, so that when some of the lamps are out there will be no spotting of the surface. Furthermore, economical maintenance is obtained, because a surface well illuminated at all times, can be kept in good condition with less frequent servicing.

For incandescent-bulb lighting, a minimum of one lamp should be used to one and one-half times the square of the distance from the lamp center to the glass. In Figure 1, the lamps are stag-

FIGURE 2.—The maintenance man raises a window to gain access to the inside of the sign, for replacing lamps or performing any other duties which may be required. (Wagner Sign Service photograph.)

FIGURE 3.—The window is held open by a small hook, thus leaving the maintenance man's two hands free to work inside the sign. The frame itself is never removed (Wagner Sign Service photograph.)

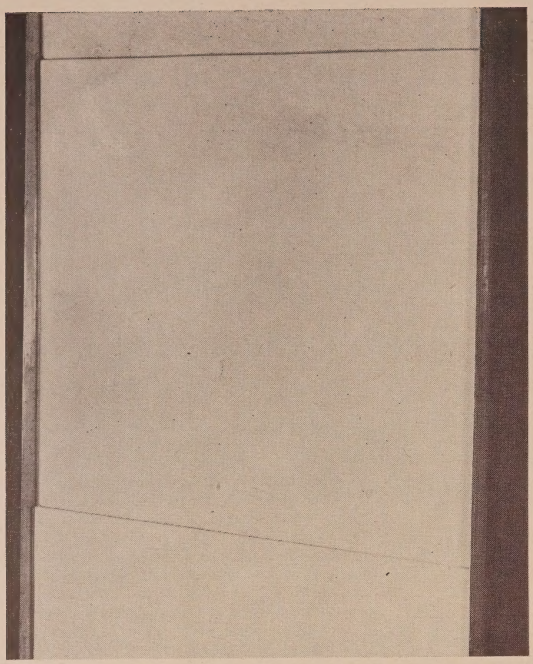


FIGURE 4.—This is a rear view of one window panel. All panels, except the top one, slide in narrow guide channels, placed at such an angle that each glass slides behind the one above. The glass may be removed by simply raising the panel above the top of the channels. (Wagner Sign Service photograph.)

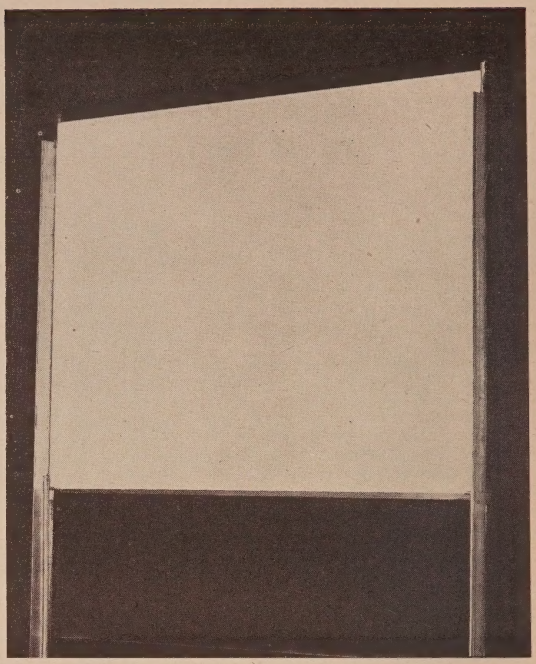


FIGURE 5.—This is a rear view of the top panel. Note the short channels at the top and bottom. By simply raising this panel above the bottom channel and bringing it down inside the sign, the glass may be removed. Any size letters and transparencies may be used with this sign. (Wagner Sign Service photograph.)

gered, with 6-inch centers. No fewer lamps than 9-inch centers staggered should ever be used.

Incandescent bulbs are far better than neon for lighting an attraction board or changeable letter portion of a marquee, since they give off all the true color rays, some of which are missing when using neon or fluorescent lighting. This factor is becoming increasingly important with the more extensive use of translucent colored plastic letters and colored photo transparencies. Furthermore, neon should be used only in mild-climate territories. In any event, only fluorescent or high intensity tubing should be selected. White fluorescent tubing is by far the most satisfactory in all cases where this type of illumination is used.

The tubes should be spaced on no less than 7-inch centers, in locations with little light competition, and on closer centers where light competition increases. In extremely brilliant locations, the tubes should be on 3-inch centers.

MAINTENANCE

The demand for easier methods of maintenance of the changeable letter portion of signs has recently resulted in the development of a window-type marquee frame which allows openings of any height and length. Servicing this new frame is simple. The maintenance man raises any window to gain access to the inside of the sign. The window is held open by a small hook and both hands are free to work inside the sign. (Figures 2 and 3.)

All the panels, except the top one, slide in narrow guide channels, placed at such an angle that each glass slides behind the one above. (Figure 4.) The glass may be removed by simply raising the panel above the top of the channels. Short channels are provided at the top and bottom for the top panel so that by raising it above the bottom channel and bringing it down inside the glass it, too, may be removed. (Figure 5.) All parts of the sign, lamps, neon, and glass, may thus be serviced through open windows and may be replaced easily without removing frames. A further advantage is that the window-type frame may be permanently and separately installed, with the glass put in place later. The frame need never be removed, and no shopwork is necessary in the event of glass breakage. All of these factors tend to reduce maintenance costs.

The type of frame construction permits greater billing space and the use of the larger-size letters and life-size photographic transparencies.

INSPECTION

All illuminated signs should be inspected daily. Burned out parts, tubes, and lamps should be replaced immediately. Glass, tubes, and bulbs should be washed at least once a month, so as to reap the full benefit of all the power used.

PAINTING

Painted portions of signs should be repainted at least once a year, and the interior of the attraction board space should be washed or painted every six months, or oftener, depending upon the condition, since this interior must be kept white and highly reflective to obtain the full value of reflected light. Light meter readings show that a 15-watt lamp in front of a clean white background will deliver 50 per cent more light than a 25-watt lamp against a dirty interior background.

UTILIZATION

To avoid the monotony which results from the use of changeable letters of one size, marquee copy should be laid out to take full advantage of the various sizes of letters now available. The tasteful use of color and illustrations, afforded by the use of plastic letters and photo transparencies also add to the effectiveness of any display. Anyone with the money can buy advertising space. It is the use to which it is put that counts. Do not let just anyone lay out the billing copy: Delegate the job to one man, and be sure he is the best man available.

Trends in Theatre Design and Construction

A Greater Utilization of Materials, Light Seen as Features of the Post-War Building

As theatre construction enters upon a new era—a period of resumption if not entirely new ideas—it is well to stop a moment and take note of what the present situation is in regard to exterior appearance.

Perhaps the most outstanding development is a continuation of that which has been going on for years: the ever-decreasing amount of gingerbready ornmentation, and the ever-increasing amount of decoration stemming strictly from materials themselves and the way various combinations of materials are handled.

Here in the eleven theatres presented on these pages will be noted the utilization of the decorative possibilities inherent in the materials themselves. (All the pictures, save that of the Kaywood Theatre, have seen used through the courtesy of the Adler Silhouette Letter Company and Ben Adler, its president.)

Second noteworthy trend to be noted in the increasing use of light, not only as a background for current-attraction advertising, but also for the more subtle —at least, continuing—aspects of institutional propaganda. The development of the silhouette letter can, to a great degree, be considered as giving the impetus to the greater use of light.

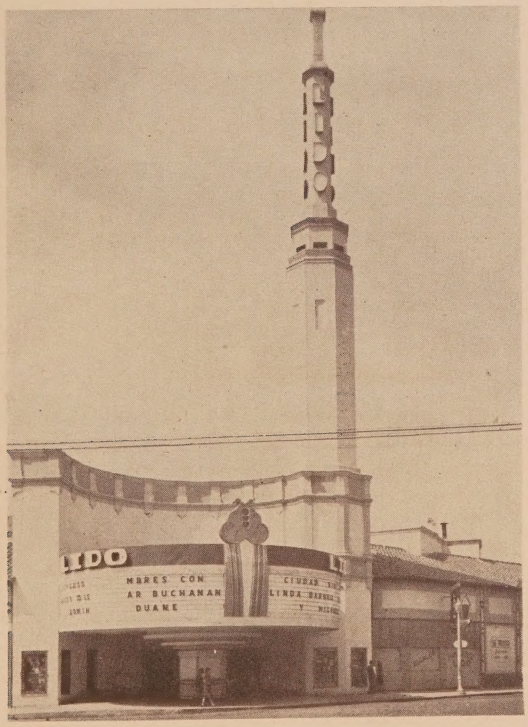
Not only have these developments been observed in the conventional type theatre in the business areas, but the trends are apparent in the drive-in type of cinema. Perhaps the outstanding example of the utilization of possibilities is that exhibited by the Valley Drive-In Theatre, where the gigantic screen-tower structure becomes, by day or night, a mighty "mural" on the landscape.

It is, perhaps, in night photographs that the true ability of a designer is revealed, for then it is the theatre itself that becomes the dominant feature, to attract or not depending on how light has been handled. With the Huntridge Theatre, the power of light has been utilized in its simplest—and perhaps most potent—form. After sunset the first thing that attracts the attention is the theatre name, gleaming forth against the backdrop of night, and then the brilliantly lighted marquee, and finally the posters and the light-lined box office.

Special mention should be made of the manner in which the Mexican architects have used decoration, particularly on the Lindavista Theatre. Here indeed was the chance to "go gingerbready" but the architect wisely restrained himself, using only that which would accentuate the over-all motif of design.

Thus it is here, as shown in these pictures, that American design and construction—and that of the world, too—resumes its march of progress toward better and better theatres, and it may be presumed, from these manifest trends, that future cinemas will more and more accentuate the inherent decorative possibilities of construction materials and all augmented by the judicious use of light and color.

LIDO THEATRE, Mexico, D. F., Mexico, is strikingly different from American theatres, with the semi-circular marquee, over which towers a name-bearing spire. Here possibilities of advertising have been cut to a minimum, and even the marquee is more redolent of art than commerce. However, it suits a corner site.



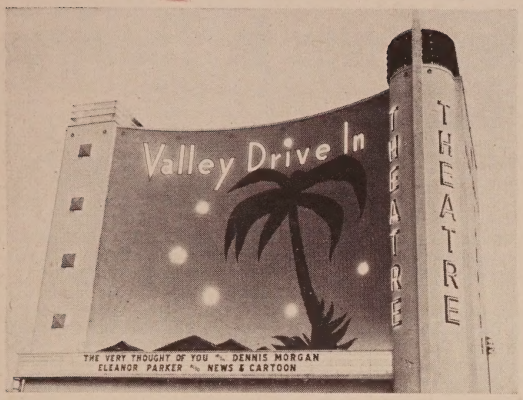
LINDAVISTA THEATRE, Mexico, D. F., Mexico, with a circular marquee, seemingly apart from the theatre proper, is in striking contrast to most theatres. But here, with a massive name-tower rising from its center, the marquee befits, in theme and decoration, the almost "mission" motif of the theatre proper.

KAYWOOD THEATRE, Mount Ranier, Maryland, shows the influence of nearby Washington, D. C., where ordinance prohibits marquee billing. The plainness of the facade, together with the brick construction also reflects the Capital influence. The absence of an outside box office adds a further unusual detail to the theatre.

STUART THEATRE, Lincoln, Nebraska, presents a striking appearance at night, with its three rows of changeable letters surmounted, pylon-like, by the upright theatre-name sign. The board carrying the star name, at right angles to the marquee-front board, has many possibilities in exploiting the attractions.

HUNTRIDGE THEATRE, Las Vegas, Nevada, uses light to great advantage by emphasizing merely the theatre's name and a simple billing of the current show. Note particularly the suggestion of building created by the dimmer base lighting of upper portions of the building. Light-lining of the box office is good.

WILL ROGERS THEATRE, Chicago, Illinois, while still holding to some incandescent lamps work, has changed its signwork, to add a modern touch that is still no more up-to-date, than the structural concrete used in its construction. Light, as well as the decorated sidewalk, enhances the name and reputation of Will Rogers.



VALLEY DRIVE-IN THEATRE, Harlingen, Texas, possesses a striking screen house by day or night. The mighty silhouette of a cocoanut palm, adds an interesting touch by daylight, and puts to good use an otherwise expansive mass of unrelieved blankness. As night falls, and the lights go on, the interest mounts.

VALLEY DRIVE-IN THEATRE at night is even more interesting than by day, with the street side of the screen-house tower decorated and illuminated to give the impression of a great constellation rising o'er the pyramidal mountains. Lighting is doubly effective because there is no detracting from the "marquee" billing.

ARLINGTON THEATRE, Arlington Heights, Illinois, reveals an unusual treatment of a marquee adapted to appeal from but one major direction. From the shape of the marquee, no less than the position of the circular display frame, the theatre is well adapted to its site. Note too, the architectural simplicity.

ROYAL THEATRE, Miami, Florida, with virtually a sidewalk lounge, takes advantage of the mild climate. The very plainness of the architectural plan accentuates the signwork, an interesting point in which is the listing of the price scale for the benefit of non-residents who might be interested in seeing the show.

MIDTOWN THEATRE, Detroit, Michigan, shows a relatively plain front, with the triangular marquee the dominant feature. A touch of the "old" still obtains in the use of the incandescent lamps rimming the program boards and lining the way to the box office. Glass block between the advertising frames helps.

AUBURN THEATRE, Rockford, Illinois, besides possessing plenty of signwork and program-board space, accentuates the positive of its position with the corner of structural glass block. Here, indeed, is emphasized what can be done with plain brick, when decoratively augmented by glass and other modern materials.

Rubber Mats to Play New Roles in Theatres

New Ideas Promoting Cleanliness and Safety Will Be Realized When Rubber Is Available

By E. C. LORRAINE
Lorraine Rubber Engineering Company

World War II caught the United States absolutely nude, not only unprepared for defense, but devoid of ample supplies of war-vital raw materials. That in rubber was one of the most drastic of these shortages, and rubber was a most essential part of war maintenance—aviation, tractors, jeeps, radar, radio, flame throwers, PT boats, and, even the biggest "egg" of them all, the atomic bomb.

In thinking up new and wond'r us ideas, Jules Verne and H. G. Wells are pikers, compared to the fantastic ones which originated in this crisis. Fantastic was a mild term; ideas were submitter which seemed to be expressions of a demented mind, looked ridiculous on paper, and impossible from drawings and chemical formulae.

But now, rubber, chemicals, air, and so forth, which were applied to war services, are being converted to the benefit of man, and not to his destruction. And we have come to the point where two of these dreams can be applied to the use of the theatre.

The theatre is little concerned with what has gone before, but it is very much interested in the present and the future of public amusement centers. And so, theatres, left high and dry for want of rubber, the material, eagerly await the return of rubber because of its sanitary and safety factors.

VACUUMING INCOMING PATRONS

The main factors in theatre maintenance, from a general survey of the manager's problem, are (1) sanitation, (2) safety, and (3) economy, without the sacrifice of any convenience to the patrons.

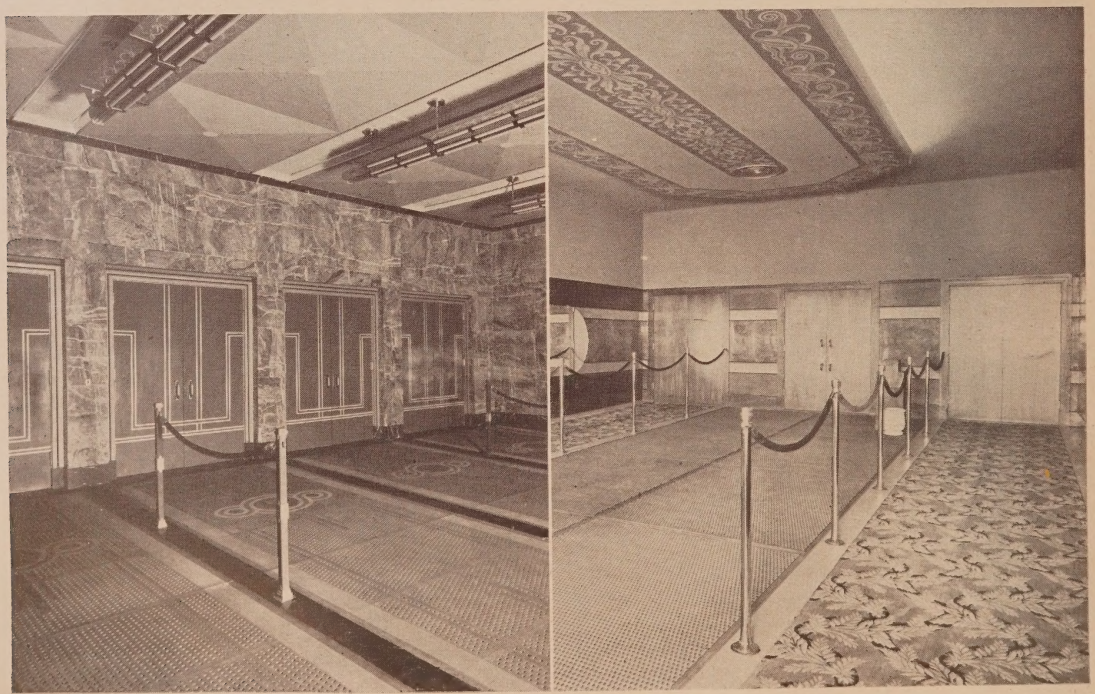
The theatre's first problem is to keep dirt and grime as far from the foyer and auditorium as possible. This can be controlled by an especially soft, sponge-rubber mat laid in ridges, so that the sides of the foot would sink into the grooves, scraping dirt off the shoes and not leaving it on the surface to create dust to be inhaled by the people.

Now, what to do with the dirt. Underneath the mat would be a series of suction tubes to pull the dirt into a receptacle, filtering and conditioning the used air and returning it to its original function. This would prevent the dirt from being carried into the theatre proper, and not leaving it on the surface from where it would be tracked further to the carpets of the auditorium. This should be known as the vacuuming section.

Further, inside the entrance of the foyer, as an additional safeguard, would be another series of mats across the doors which would function only as a vacuum without any aid from above, which will be explained further on.

What about snow or water carried into the lobby; or water from dripping clothes, shoes, umbrellas, and so forth? This would be pulled in through the same tubes, but the traps would send this water into the proper disposal pipes to

TRADITIONAL USE OF RUBBER MATTING is exemplified in these two pictures of theatre lobbies. Prior to the war such matting was used largely in that portion of the theatre acting as the transition area between the outside and the inside, and that area over which the line of traffic is heaviest and most concentrated. The matting, while considered as a means of removing much of the dirt from patrons' shoes, was not thought of in the ways suggested in the accompanying article.



carry it off so that it would not in any way clog or interfere with the return of reconditioned air.

Now, to use the hot air from radiators, these radiators could be eliminated entirely and, in their place, there would be a series of controlled hot air pipes that would function synchronously with the suction element, and would be directed from above and, in cold weather, a uniform temperature could be maintained, as heat rises and cold descends.

In the floor, the lobby would have a controlled heat in cold weather and, at the same time, could be used as air-conditioning in hot weather. This hot air, coming from the top and sides, would also have a tendency to dry the garments of the patrons. This hot air could also be used as a sanitary agent, especially in places where epidemics occur, by impregnating it with such chemicals as are advocated to control or immunize the public from contagion. Thus, the theatre could keep open where otherwise it would probably have to be closed until the danger had passed.

All the foregoing may also sound fanatic, but fact of the matter is an installation of this very sort has been designed by Frank Lloyd Wright, foremost exponent of integral, functional architecture, to be incorporated into the Museum of Non-Objective Painting to be erected in New York for the Solomon R. Guggenheim collection.

Air-conditioning engineers had better get busy, as there will be no limit to what will be required by the up-to-date theatre operator.

LUMINESCENT RUBBER MATS

During the war, many experiments were conducted with flares, black light, luminous powder, phosphorescents, and the like, to develop a method of detecting and identifying objects to be bombed.

The cost of properly lighting a theatre lobby is a problem of maintenance control. Fluorescent tubes must be replaced, if this type of lighting is used; if semi-direct lighting is used, bulbs have to be replaced, and fixtures have to be maintained. A labor problem is also involved.

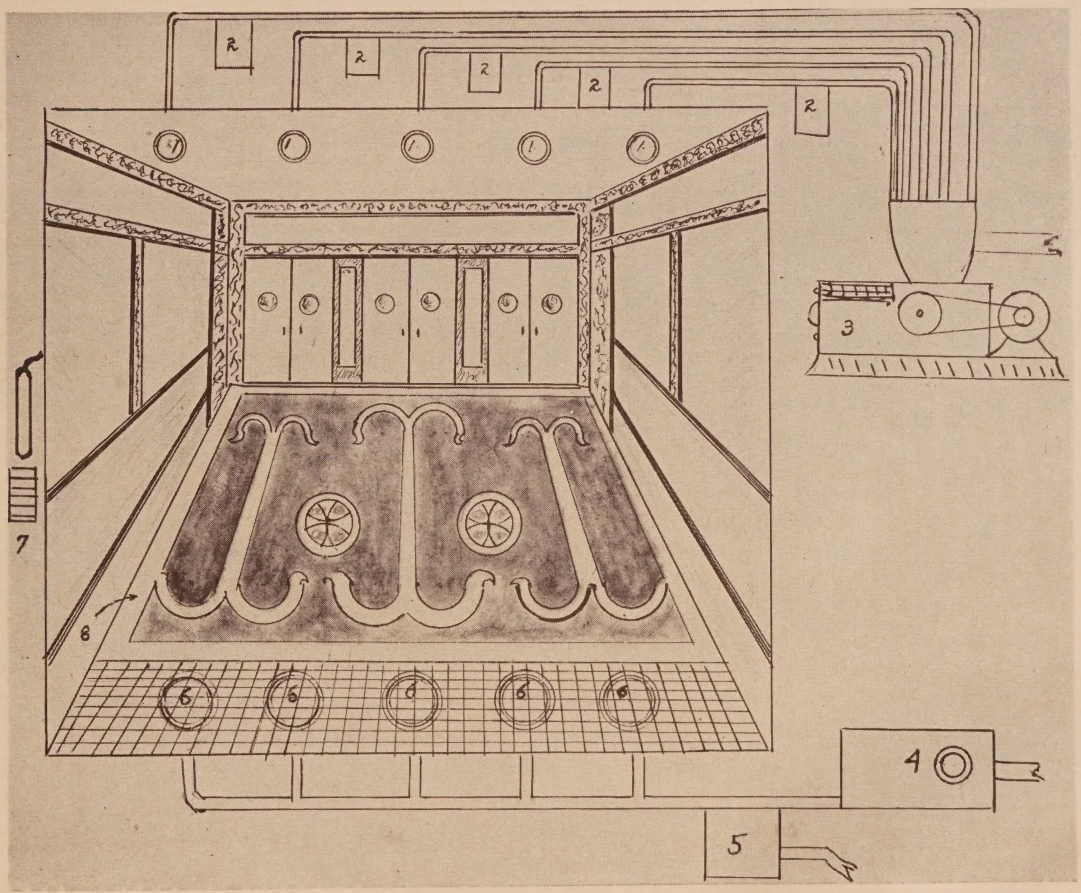
Therefore, the use of artificial light, as used in the war, is now being applied to rubber mats.

Most rubber mats are laid out in designs of various combinations of colors; some in modernistic design, some in plain stripes, and others in patterns to harmonize with the architecture of the lobby. It is with this thought in mind to utilize the design of the mat not only to bring out the beauty of the pattern, but, at the same time, to serve to light up the lobby by means of luminous materials embodied in the rubber.

Not only could directional lines be made more prominent, but they also would serve as a safety guide to entrances and exits in the lobby. Experiments thus far have been encouraging; but, due to government restrictions on certain materials, progress has been somewhat delayed.

Walls will also be treated in rubber or similar materials to obtain the same effect.

NEW IDEAS IN PROMOTING CLEANLINESS AND SAFETY are set forth in this picture: (1) Air vents in the foyer ceiling through which hot air and immunizing chemicals descend upon the incoming patrons; (2) the tanks containing the chemicals; (3) the pressure pump which operates the system; (4) the vacuum pump that draws from the foyer floor dirt and water tracked in by patrons; (5) the water and moisture trap; (6) vents in the floor for vacuuming, in conjunction with a special floor mat; (7) black light, hidden behind frames or mirrors; and (8) mats with special elements to illuminate lobby with black light tubes and filters.



The Maintenance of Hard-Surface Floors

The Proper Housekeeping Methods Prolong Life and Beauty of Hard Floor Coverings

By Dave E. Smalley

General Manager, Continental Car-Na-Var Corporation, and Editor, Floorcraft

While this writer professes to be something of an authority on floors, after giving them more than twenty years study, his knowledge of theatre floors in particular is limited to the casual observation of a regular theatre-goer. However, there is no logical reason for theatre floors or their problems to differ from those of other public buildings.

The prevailing types of floors in theatres seem to be wood, terrazzo, ceramic, marble, quarry and vitreous tile and asphalt tile, and in this article we will confine our subject to these particular floors, stressing more their treatment and maintenance than their structure.

WOOD

Taking wood first, because it is perhaps the most universally used, especially in the auditoriums of the smaller theatres, there is no need to discuss structure. Everybody is sufficiently familiar with this phase already. Treatment and maintenance seem to be the only problems presented by wooden floors and these we will cover concisely, as follows:

Of course, wooden floors should be as smooth as possible, the result of proper sanding when they were first installed. A rough floor can never be maintained very satisfactorily. In fact, it cannot be even swept clean.

After sanding, the wooden floor should be sealed with a reliable floor seal and in the auditorium where utilitarian needs are of more importance than appearance, we would suggest a "penetrating seal." This is a type of seal with maximum penetrating qualities so as to fill the pores and firmly "anchor" itself to the floor. Usually a coat is applied with a mop, allowed to set for about thirty minutes and then the surplus rubbed off with burlap sacks or other convenient rags. It should dry in about eight hours so that a second coat may be applied and rubbed off in the same manner.

Steel-wooling each coat of the seal insures best results, but since this would be difficult after the seats have been installed, it is not essential

The best floor seals are made of phenolic resins (Bakelite is a phenolic resin). In appearance they look very much like any other varnish, but they give a much tougher and more flexible surface. They are slower to dry and therefore not so suitable for seats, but quick drying seals and varnishes are brittle and wear off quickly under foot traffic. A floor seal which dries in less than eight hours may be regarded with suspicion.

When properly sealed, the problem of maintaining wooden floors is greatly simplified, not to mention the improvement in sanitary conditions, and the fire hazard from cigarettes, matches, etc., is decreased.

WOOD FLOORS IN THEATRES have largely given way to decks of other material, but many a smaller theatre still has them. In these Continental Car-Na-Var Corporation photographs, two typical types of wood floors are shown. At the left is a corridor in New York's Little Sisters of the Poor, and, at the right, a parquet floor in Saint Louis's Saint Philomena's Technical School. Both types of wood floors show how, when properly maintained, the inherent beauty of the grain and finish can be preserved to become part of a theatre's over-all decorative scheme. Properly finished floors are easier to maintain.

TERRAZZO

Among the hard surface floors in the average theatre over the country, terrazzo seems to predominate, especially in the lobbies and rest rooms. Made of marble chips in a cement base, terrazzo is not only a very durable floor but also a very attractive one. Neither is the maintenance of terrazzo a major item. It is rather easily mopped clean and because of its variegated pattern it does not show soil as readily as does light colored tile or marble.

However, terrazzo does often present a problem by its tendency to "bloom." A fine, powdery substance appears on the surface which is also referred to as "dusting." Usually "bloom" comes from a faulty mixture at the time the floor was laid, but it can also be caused by improper cleaners. Never use harsh alkalies or abrasives on a terrazzo floor. Alkaline solutions penetrate the fine pores of the marble chips and when dry the alkaline crystals in the pores cause the surface of the marble to expand and crumble.

A neutral soap type of cleaner is safest and most satisfactory for terrazzo, though if used too lavishly it should be rinsed off to prevent possible slipperiness.

Special seals for terrazzo were becoming fairly common before the war restricted the use of chlorinated rubber and the necessary solvents, but they were never entirely satisfactory. Most of them were so low in solid content they left scarcely a trace of film on the floor. Yet, had they carried a higher percent of solids they would very likely have given a tacky surface.

Perhaps, eventually a reliable seal for terrazzo will be developed, but for the present we would say experiment with them cautiously, and never, in any case, use a regular floor sealer on terrazzo. Not only will it give a light terrazzo a "yellowish" cast, but will wear off in lanes of traffic, presenting a difficult repair problem.

Although some theatre owners may look upon a waxed lobby as a hazard, acres of terrazzo floors over the country are being safely and satisfactorily maintained with floor wax. Many of these are hospitals, schools, old peoples' homes, etc. To mention a case or two, there are 90,000 square feet of terrazzo beautifully maintained with floor wax in the Evangelical Deaconness Hospital at St. Louis. There are several thousand feet more in the Home for the Aged of the Little Sisters of the Poor of New York. The vast corridor under Boulder Dam, through which thousands pass weekly, is floored with glistening terrazzo treated with floor wax.

Wax emphasizes the colors in terrazzo and practically eliminates the need for mopping. The soil from traffic does not adhere to a good floor wax and the usual stains do not penetrate.

If you are still doubtful about the safety of floor wax in your lobby, you can experiment with a strip on the floor and watch the customers walk on it for a few days. If they slip, remove the coat with warm water and soap, or in this case you may need a mild abrasive like Babo or Dutch Cleanser. Or you can dilute your wax with 50 per cent water and apply it, buffing to get a satin-like finish. In recommending dilution with water, we have a self-polishing water wax in mind, as usually this seems best adapted for terrazzo.

UNDER BOULDER DAM, in Colorado, is one of the country's most extensive corridor systems, all with terrazzo floors. Seen here, in a Continental Car-Na-Var Corporation photograph, is the method of maintaining this vast network in its pristine condition. Terrazzo is easily mopped clean and, because of its variegated pattern, it does not show soil as readily as either light colored tile or marble. Much terrazzo is used in toilets.

CONCRETE

Concrete floors seem to prevail in the auditoriums of most of the larger theatres and since they are carpeted in the aisles the chief problem of maintenance is under the seats. Here, as in the case of the wood floors, the problem is more of utility than of appearance.

If the concrete floors are "dusting" badly, they should be given a wash with either silicate of soda or fluosilicate (about 20 per cent in water). If not dusting too badly, an occasional mopping

TERRAZZO IS ONE OF THE MOST POPULAR types of floor finishes for theatres, to not a little extent because of the infinite variety in colors and designs. Made of marble chips set in cement and highly polished, only the artistic imagination of the designer limits the possibilities. In this Portland Cement Association photograph are seen the two general types of treatment: (1) an over-all design and (2) a massive central design.

with a good neutral soap will usually serve the purpose.

Seals and paints are often used on concrete with success, but only those should be used which derive from phenolic or rubber resins. The natural alkali in concrete causes ordinary floor paint to disintegrate.

Before painting any concrete floor, it is advisable to first etch it with 10 to 20 per cent solution of muriatic acid. Apply this solution with an old mop and when it ceases to effervesce, rinse with clear water and let it dry. The etching process gives the paint an opportunity to penetrate sufficiently to give it the needed anchorage. Otherwise, it will peel off.

In preparing the etching solution always pour the acid into the water—never the reverse, and avoid getting it on the hands or clothing.

MARBLE

Marble floors should be maintained very much the same as terrazzo. Never mop or scrub them with alkaline solutions and of course acids are their natural enemy. Clean them with a neutral soap when necessary, and there is no better protective medium than good floor wax of the water emulsion type. Here, again, if you fear slipperiness dilute wax 50 per cent and polish by buffing. Since marble is even more susceptible to stains than terrazzo, a protective coating is relatively more desirable.

QUARRY AND VITREOUS TILE

Quarry and vitreous tiles, particularly the latter, are less sensitive to chemicals and therefore do not call for so much caution in the matter of maintenance. The most vulnerable part of these tile floors is the grouting between the tiles. Sometimes it has a tendency to disintegrate or "dust," and this, too, could be the fault of the installation or it could come from chemical reaction induced by a cleaner.

There seems to be no real remedy for bad grouting, but some relief may be obtained by mopping only with neutral soap.

Stains can sometimes be removed from the vitreous tile with a mild acid solution, particularly around urinals. Sometimes a scouring powder is useful. If an acid solution is used on quarry tile, however, it should not be allowed to stand too long, and should be followed with a soda solution to neutralize any remaining acid.

As in the case of terrazzo and marble, wax is again recommended as the best maintenance material for quarry tile. It is not, however, quite so well adapted for the vitreous type. Here, as indicated above, neutral soap is probably the best material for general maintenance.

IN LOUNGE ROOMS, ASPHALT TILE is of especial service, as is shown in this Johns-Manville Corporation photograph, where the floor covering is of that company's products. In maintaining floors of this type, it is important that the use of too much water be avoided in the mopping and scrubbing processes. Excess water, seeping between and under the tiles, may cause them to loosen, thus increasing the theatre's repair budget.

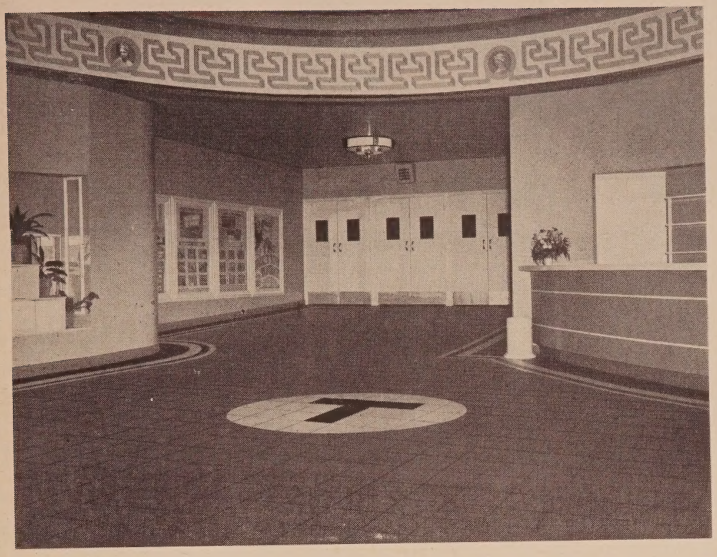
THE LOUNGE of the Post Theatre, Fort Sam Houston, Texas, has a floor and dado finished with quarry tile of the United States Quarry Tile Company. The general plan employs 6x6 Rainbow quarry tiles, with 2¾x2¾ decorated inserts. Quarry, as well as vitreous, tile is easily maintained, because, being somewhat less sensitive to chemicals, not as much caution needs to be exercised in the selection of the best proper cleaning materials.

ASPHALT TILE

We have covered the principal hard surface floors in the foregoing and now come to asphalt, which is neither hard nor soft but which probably comes nearer being the former than the latter. It is being used rather widely in all types of public buildings, including many of the smaller theatres.

Though less attractive, perhaps, than some other types, because the nature of it precludes the use of distinctive colors, it makes a very durable, sanitary floor and because it is resilient it is a comfortable floor for walking or standing. And because it is usually dark or neutral in tone, it does not show soil easily.

Asphalt tile does, however, present some special maintenance problems. Oils, gasoline and grease will dissolve it. Never attempt to use the solvent type waxes, varnishes or sweeping compounds on asphalt tile. Even some soaps loosen the colors in this tile and cause them to run. Therefore, test a new cleaner, preferably with a white rag, before using it on your asphalt tile. If the color comes off on the rag, avoid the use of that cleaner on your floor. Also avoid the use of too much water in mopping or scrubbing. It seeps down between and under the tiles, causing them to loosen.



THE FOYER OF THE TOWER THEATRE, Marysville, California, is floored with the Armstrong Cork Company's asphalt tile. The field of the floor is composed of 9x9-inch blocks of Spanish red. The feature strip is of white, with the letter T in regal blue, on a white background. While used in many theatres (especially the smaller ones), asphalt tile presents some maintenance problems, which, however, are minimized by following instructions.

LINOLEUM

Technically speaking, linoleum and rubber tile definitely are not classified as hard surface floors, but in their relation to carpets, mattings, etc., they would probably be so regarded. For that reason we will include them.

Made principally of ground cork and linseed oil, pressed under heat, linoleum provides one of the most satisfactory floor coverings and if properly maintained will give long service.

However, if linoleum is abused its life will be short. In fact, linoleum is probably more susceptible to abuse than any other type of floor covering. Alkali is the natural enemy of linoleum and should never be used in cleaning processes. This includes nearly all washing powders and strong soaps. To a certain extent, alkalies make "soap" of a linoleum. If cleaners must be used, confine them to neutral soaps. There are neutral soap floor cleaners made of linseed oil and these are best adapted for the purpose. Clear water does not injure linoleum unless so much of it is used that it seeps under the edges. Then it causes the burlap backing to decay and the linoleum itself to disintegrate.

Linoleum manufacturers tell us that linoleums are seldom worn out. They are washed out. Therefore, clean them with a minimum of water.

Although there are varnishes recommended for treating linoleum we know of none we would recommend, unless the covering is so badly worn the varnish is needed to extend its life a little while longer—as long as the varnish itself lasts. Varnish cannot be successfully removed from linoleum because it is much of the same type of material and anything that will dissolve varnish will also dissolve the linseed binder in the linoleum. As most linoleum manufacturers will tell you, floor wax is the ideal material for maintaining linoleum, either the self-polishing or the buffing type, but if the former is used it should not contain excess alkali.

RUBBER TILE

Previous to the war, the use of rubber tile was spreading rapidly, but like most other rubber products its production has been practically suspended. Undoubtedly when raw material is sufficiently available rubber tile will again enjoy an increasing popularity.

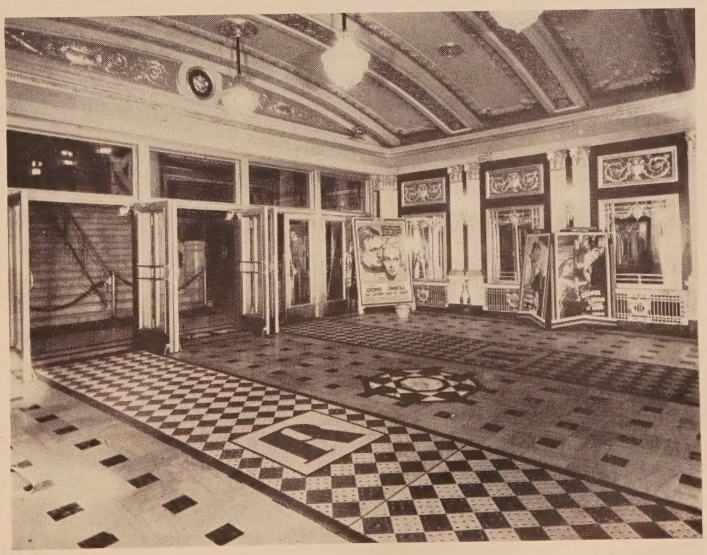
Rubber tile is made of rubber, pigment and fillers, the latter varying with the brands of manufacture. When well made, it has a fine hard plate finish and gives a most attractive floor. Being very resilient, it is nearly sound proof, provides foot comfort in walking or standing and is easily maintained. However, it is almost as sensitive to abuse as linoleum. While alkalies do not necessarily injure it (though they sometimes attack the pigment and fillers in some brands) it is not advisable to use them excessively. Mild alkaline cleaners are about the only cleaning materials approved by the Rubber Manufacturers' Association but, as in the case of linoleum, too much water must not be used, lest it seep down between the tiles and loosen them from the floor. Soap should never be used on rubber. In fact, nothing made of oils or fats.

Solvent type waxes (the kind you have to buff) are injurious to rubber tile, but the water waxes are harmless and, if they are good, afford the best material for maintenance.

Here again, wax is recommended and for safety sake it can be diluted and polished.

Wax, you will see, is our preference in most cases because wax is a "natural" for floors. Not merely does it give the floor a richness obtainable from no other medium, but being pliable it is "self-healing" and its slight lubricating properties give the best protection to the floor. Added to these virtues is the tendency of wax to shed water, stains, soil, etc., as no other substance will do. Wax is nature's own protective coating for most of its vegetation.

MARBLE AND RUBBER FLOORING combine to make a pleasing appearance in lobby of the Rialto Theatre, Louisville. The permanent floor is marble, with the runners of rubber, and can be easily maintained in their original conditions. It is possible, by merely changing the brush used to utilize the carpet-cleaning machine on both the marble and rubber of the lobby, thus lowering expense. (Continental Car-Na-Var Corporation photo.)



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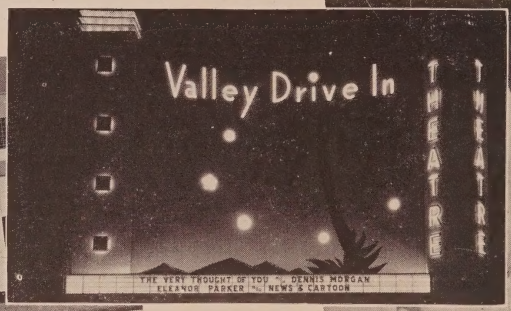
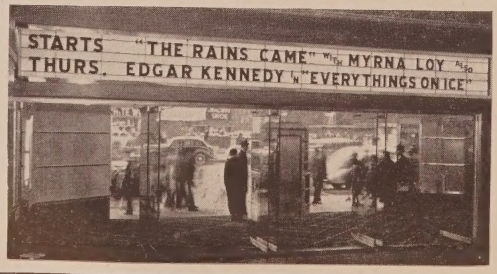
ADLER F.O. "3RD DIMENSION" LETTERS FOR MODERN DISPLAY ALL SIZES 8" TO 24" INTER-CHANGEABLE

Below, College Theatre, Brookings, S. D., an example of modern small theatre design with Adler "Third Dimension" Letters and Glass-in-Frame Units in sign.



Above, Valley Drive-In Theatre, Harlingen, Texas, with modern Adler Changeable Program Display. Adler equipment is perfectly adapted for Drive-In Theatres, to signs of any shape or size.

All-curved marquee of the Lindavista Theatre in Mexico City showing modern Adler "Third Dimension" Letters and Curved Frame and Glass Equipment.



View from inside of lobby toward street, of RKO Palace Theatre, New York, showing use of Adler 8" Letters announcing coming features.

"THIRD DIMENSION" LETTERS

Exclusive STAINLESS STEEL "REMOVA-PANEL" GLASS-IN-FRAME EQUIPMENT

For Interchangeable Use of All Sizes—8" to 24" on Locked-in-Line Multi-Decker Frames

Take advantage of modern, brilliant outstanding Adler marquee program display that successfully tells and sells the world its theatre entertainment. Fits right into the spirit of today's post-war architectural designs for new theatres—provides striking modernization effects on existing marquees. In use all over this country and abroad.

Above, Loew's Canal Theatre, New York, with continuous opening embodying curved corners and using Adler "Third Dimension" Letters on "Remova-Panel" Glass-in-Frame Units.

How "Remova-Panel" Saves Time and Labor

Simply swing out or remove entirely the small lightweight "REMOVA-PANEL", approximately 7" x 27", instead of lifting out a large, heavy glass-in-frame unit. For Fluorescent Tubing, you can reach in and put a jumper across if a tube burns out and thus keep the sign operating. "REMOVA-PANEL" units alternate with Regular Type units in the opening, as furnished. Every panel between all horizontal bars in standard "REMOVA-PANEL" units, is a removable panel.

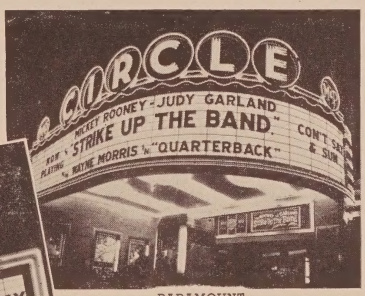
Fluorescent Tubing being lifted out through "REMOVA-PANEL."

OUTSTANDING "REMOVA-PANEL" FEATURE

Over 5 Years of Perfect Success

FOR FLUORESCENT TUBING OR ORDINARY LAMPS
SAVES ITS COST FAST IN SIGN MAINTENANCE

Ordinary lamps easily accessible through "REMOVA-PANEL."



PARAMOUNT
(See caption at right bottom.)

A Fox Theatre installation of 10" and 16" Adler Letters used interchangeably on Adler Frame and Glass Equipment.

Warner Brothers' Earle Theatre, Washington, D. C.—Silhouette Changeable Letter space 32 feet long by 9 feet high (7½ lines) mounted across the face of the building. **The "REMOVA-PANEL" feature was the only thing that made this large display possible. In successful use since Jan., 1941.**

Paramount-Balaban & Katz, Will Rogers Theatre, Chicago, a brilliant improvement made by Adler "Third Dimension" Letters over solid-back type of letter previously used in this marquee.

Centre picture, Circle Theatre, Brighton, Mass. A Paramount curved marquee with 10" and 16" Adler "Third Dimension" Letters used interchangeably, on *Locked-in-Line* Glass-in-Frame Units.

UNITED STATES PATENTS		Canadian Patents
No. 1,830,414	No. 2,156,257	No. 369,858
No. 1,989,855	No. 2,163,298	No. 411,691
No. 2,038,978	No. 2,313,723	
No. 2,113,285	No. 2,313,724	England Patent
No. 2,144,954	No. 2,319,910	No. 442,512
No. 2,155,904		

And other Patents Pending

LISTED BY UNDERWRITERS' LABORATORIES, INC.

ADLER SILHOUETTE LETTER CO.

2909 S. INDIANA AVENUE, CHICAGO 16 — New York Office: 1451 Broadway

CHICAGO — NEW YORK — TORONTO, CANADA — LONDON, ENGLAND

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MARQUEE DISPLAY FRAMES
CHANGEABLE LETTERS
LOBBY DISPLAY UNITS

WAGNER'S *Sensational New* WINDOW-TYPE MARQUEE FRAME

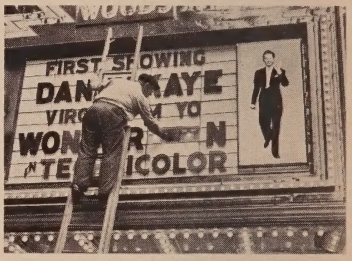
(PATENT PENDING)

THE ONLY MARQUEE FRAME WHICH AFFORDS BILLING SPACE OF ANY HEIGHT AND LENGTH

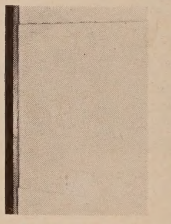
Installed separately and before the glass. . . . Accommodates the largest letters and lifesize colored photo transparencies. . . . Lamps, neon and glass can be cleaned or replaced without removing frames. . . . No flimsy soldered parts. . . . No shopwork necessary in the event of glass breakage. . . . The most economically maintained frame made.

HERE'S HOW IT WORKS!

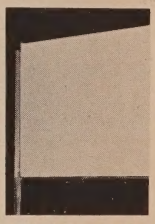
1. The maintenance man raises a window to gain access to the inside of the sign.



2. The window is held open by a small hook. Both hands are free to work inside the sign.



3. This is a rear view of one window panel. All panels, except the top one, slide in narrow guide channels, placed at such an angle that each glass slides behind the one above. The glass may be removed by simply raising the panel above the top of the channels.



4. This is a rear view of the top panel. Note the short channels at top and bottom. By simply raising this panel above the bottom channel and bringing it down inside the sign the glass may be removed.

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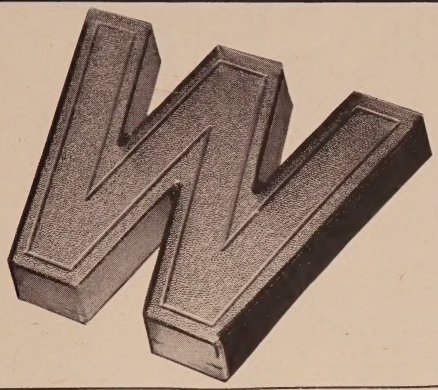

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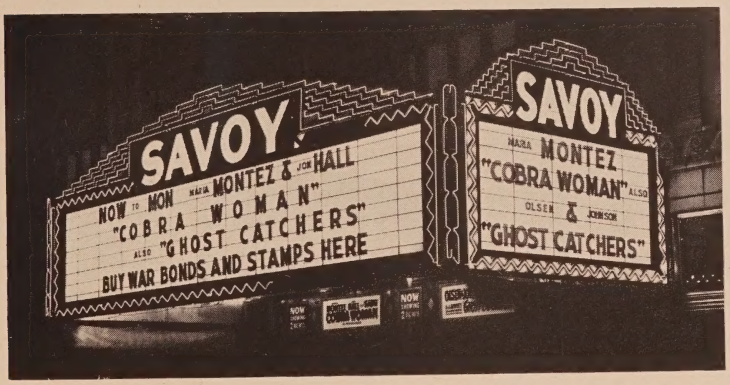

A Good Show and Wagner Letters Mean S.R.O.

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for use where especially large letters are desirable and in combination with translucent colored plastic letters.

8 sizes: 30", 24", 16", 12", 10", 8", 6" and 4" letters, all available in the Cove type, except the 6" letter which is available in Gothic only.

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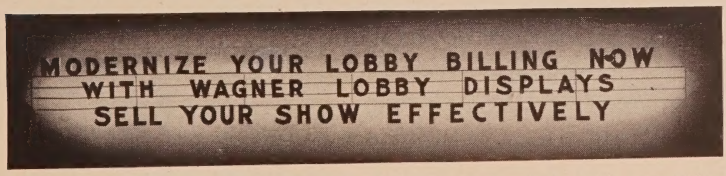

Available in any length. Constructed of sheet steel, with attractive white enamel finish. Easily installed. Letters are mounted on the bars in the middle or firmly held by clips at the top and bottom.

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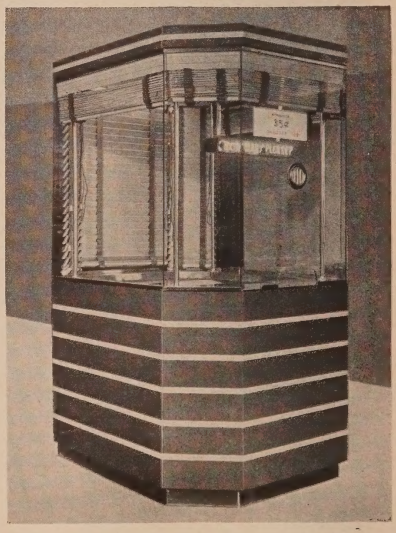

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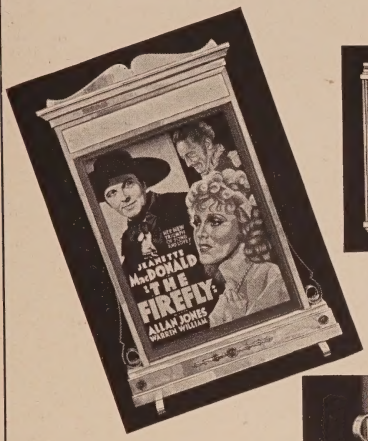

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FREE STANDING
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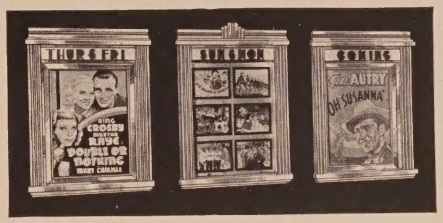
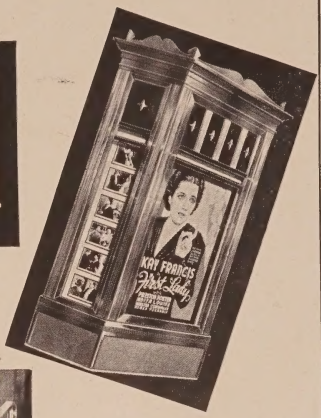


MODEL E
ILLUMINATED WALL DISPLAY FOR LOBBY



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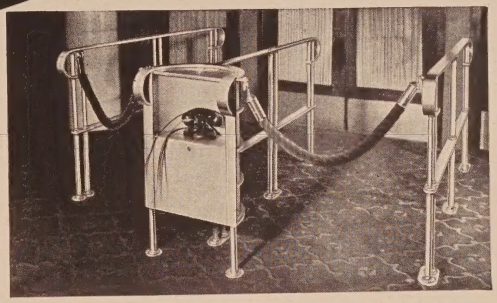

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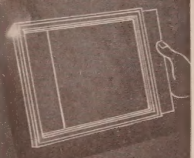

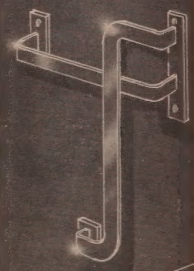

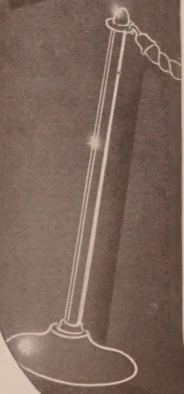

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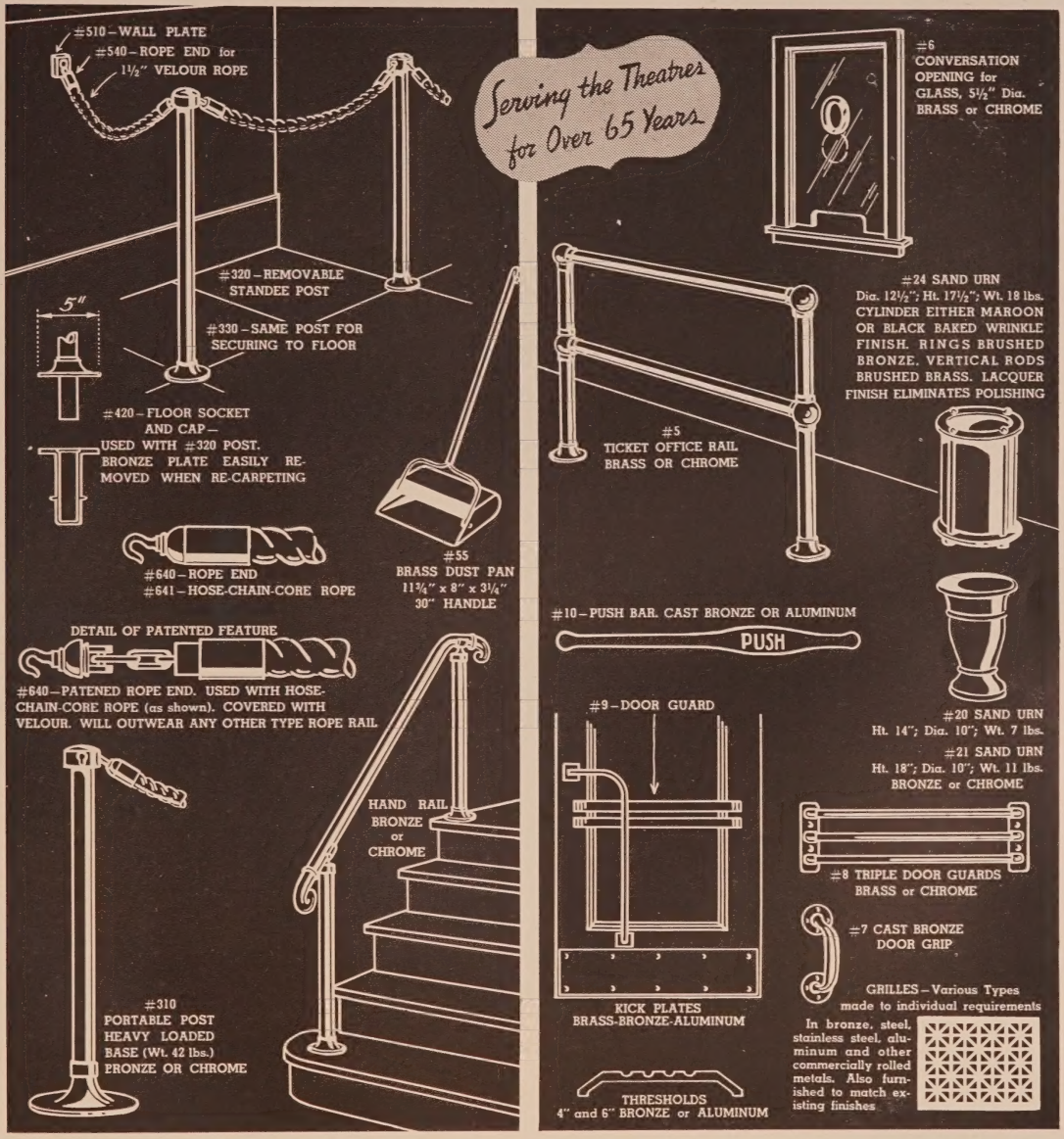

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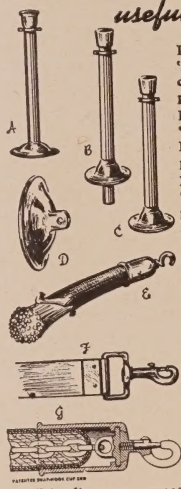

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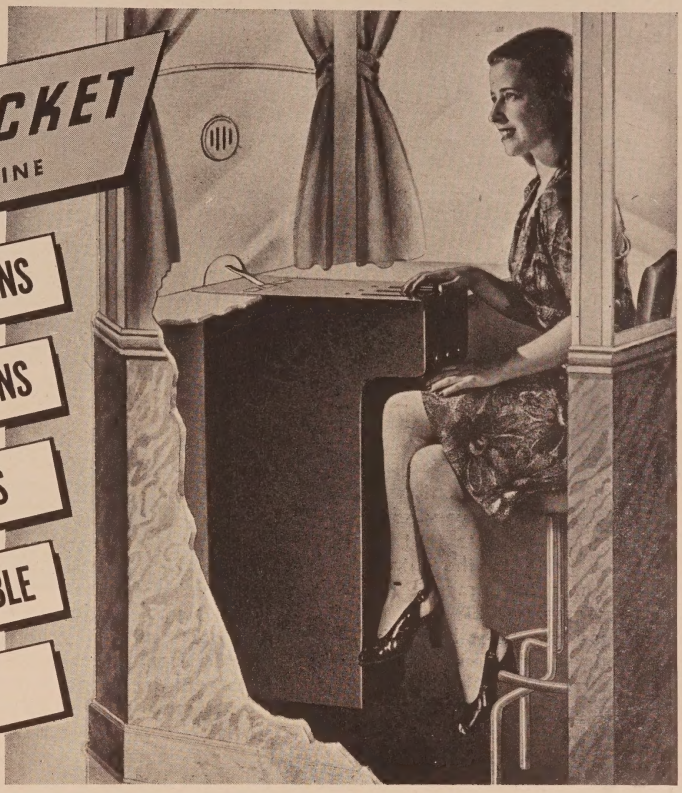

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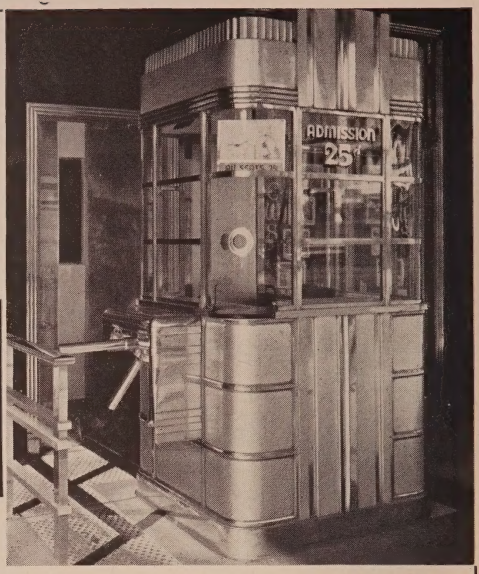

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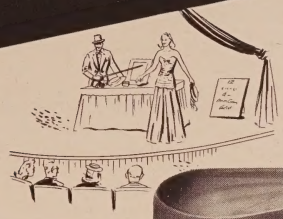

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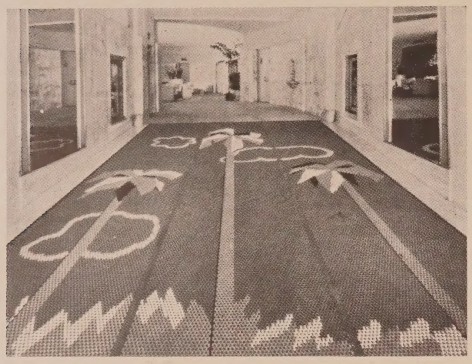

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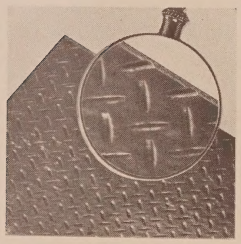

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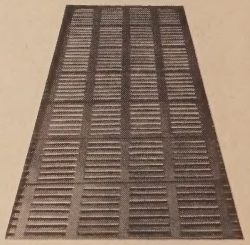

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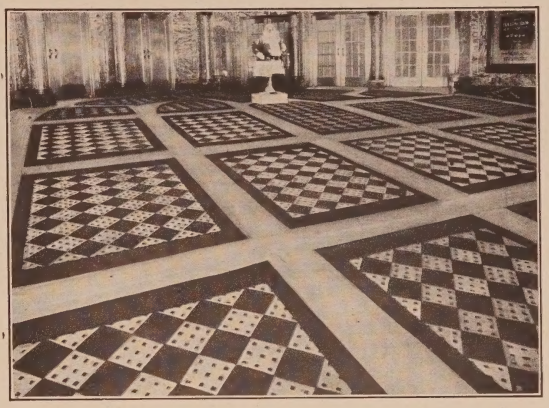

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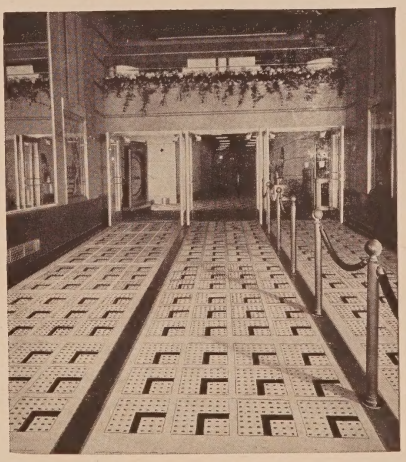

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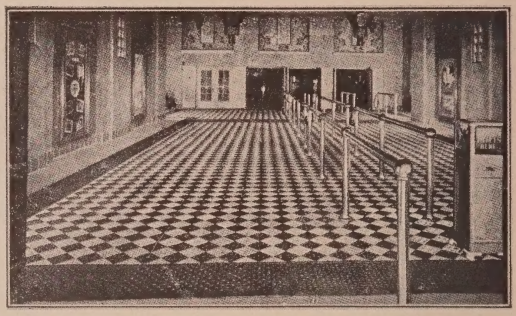

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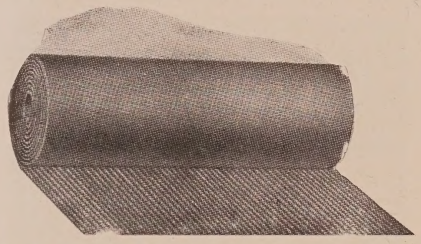

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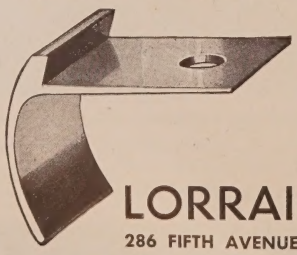

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In a highly modern way they continue the theater's tradition of colorful and striking decor.

The photo shows a battery of doors specified by John Eberson and Son for the Strand Theater in New York City.

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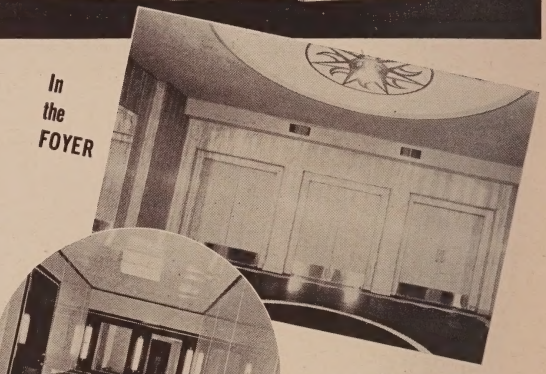

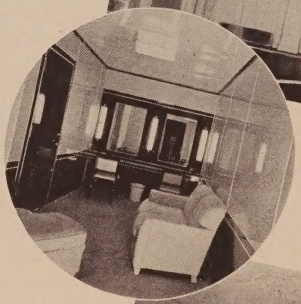

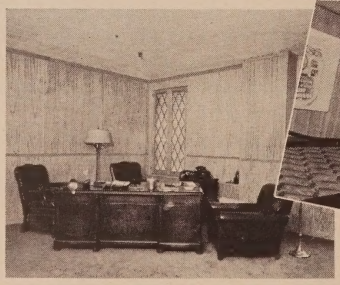

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SECTION 2-B

AUDITORIUM *and* STAGE

1945

Place of Glamour in Theatre Decoration

Correct Use of Scale, Color, and Comfort Forms the Basis of the Decorator's Credo

By DOROTHY DRAPER
President, Dorothy Draper, Inc.

Do you remember the old proverb about the shoemaker's children who had no shoes—because their father was so busy selling shoes to the neighbors?

Well, it seems to me that this is too often the case with the theatre. It lives by selling glamour to the public. But, aside from what is on stage, all too many theatres are themselves totally lacking in the thrill and glamour they dispense.

Architectural details are conventional and uninspiring. Drab or neutral colors are the rule for walls, ceilings, and floors. Fabrics seem to have been chosen because they would not show dust. And lighting suggests the era of the surrey with the fringe on top. Occasionally, of course, one sees a theatre which has gone to the other extreme. But screaming colors, shoddy materials, and forms, which aim to astonish rather than to please, are no improvement on the old formula. One comes to the conclusion that the audience is intended to enter blindfolded and keep its eyes shut till the show starts.

That is why I was so glad to be given the job of rejuvenating New York's Forty-Sixth Street Theatre, where, 24 years ago, "Good News" opened to a glittering crowd of first-nighters. Later, to mention only a few outstanding successes, came "Follow Through," "DuBarry Was a Lady," "Hellzapoppin'," and "She Loves Me Not." Here, truly, was a glamorous past, auguring well for an equally successful future, to which I might contribute by repackaging the building itself to accord with its glamourous contents. And this laboratory example would, I hoped, do a great deal to start a new mode in theatre decoration.

DETAIL OF ONE OF THE DOORS designed and executed by Dorothy Draper, Inc., for Chicago's famous Camilla House of the Drake Hotel, recognized as a most beautiful and outstanding entertainment spot.

THE CREDO

Right here, perhaps, is the place to give you my credo, covering all public decoration, whether for theatres, hotels, restaurants or night clubs. The same basic ideas have been exemplified in New York's Hampshire House, Chicago's Camellia House, Brazil's Hotel Quintandinha. The variety that can be produced from their application is infinite, but the underlying principles are the same in everything I do. All that was necessary for the Forty-Sixth Street Theatre was to give them an extra fillip to accord with the extra glamour one expects from a place devoted to sheer entertainment and nothing else.

(1) I believe in scale as a primary requisite, an A-1 attention arrester.—Architectural detail, furniture, lighting fixtures and fabric patterns which might do very well for a private house just will not do for the theatre, where everything, including emotion, must be "larger than life." But scale does not necessarily mean mere width and height, nor—to convey the soaring sense of excitement that ought to be inseparable from any theatre—should it ever suggest massiveness or heaviness. Out-size proportions must be as cleverly worked out as though though one were designing a miniature.

(2) Color, too, is all-important.—Fresh, clear, vibrant color lifts the heart, helps to create an "out of this world" mood for the hours to come. And lighting, of course, is part and parcel of color. Never before have we had access to such wonders as are ours today, when electricity has come of age, in art as well as in science. Dramatic lighting of every space in the theatre is as important as on the stage itself.

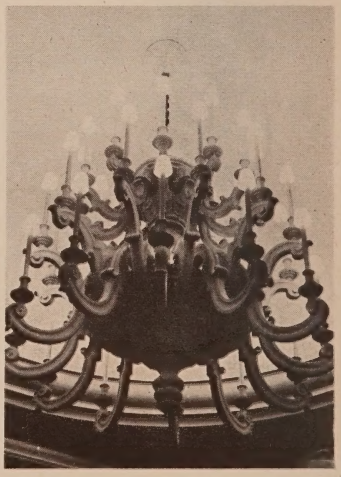
(3) But just as essential—perhaps more so—is comfort.—Comfort, luxurious comfort, necessary in a hotel or a night club, where one moves around, is even more desirable in a theatre, where one must sit still—or long for an intermission. And comfort, too, should join with gayety in lounges, refreshment spaces, and—in the case of the legitimate theatre or the moving-picture house with a stage show—in dressing rooms, too. (Probably never before has any backstage space been as glamorously planned as in the Forty-Sixth Street Theatre—including accommodations for the chorus, as well as those for the stars. Full-length mirrors, as well as those of conventional dressing-table height, stripped into a streamlined and modernly lighted wall, are the first thing one notices about chorus quarters. Comfortable, gayly-upholstered chairs take the eye. Clothes racks, giddy as a merry-go-'round, suggest a smart beach rather than a prosaic job. Stars' dressing rooms are equipped with showers, ice boxes, a whole snack-bar set-up. And draw curtains separate working quarters from what might be called the entertainment part of the suite, luxurious as one would find in a first-class hotel.)

CONCLUSION

Scale, color, lighting, seating—all as modern as tomorrow. Lounges and refreshment spaces—dressing rooms, too, if they exist—outstanding examples of the best to be had anywhere. These things ought to be the rule in every theatre, I firmly believe. And will they pay out? They will!

Keep the crowd happy and thrilled from the moment it enters. Keep it at ease when seated. Make the feminine portion of your attendance eager to come back to see that lounge color scheme again, to examine the fabric on that luxurious sofa, to covet the pictures on your walls. In short, pack every moment with its own share of glamour. Then who will have the town's most popular gathering place? There is only one answer!

THIS PLASTER LIGHTING FIXTURE, designed by Dorothy Draper, Inc., was installed in the dome of the gambling casino in the Quintandinha, the lavish sponsored city-within-a-city at Petropolis, Brazil.



Effectiveness of Fabrics in the Theatre

Needs of Sound Forced the Use of Fabrics: But They Stay as an Adjunct of Decoration

By Joseph Maharam
President, Maharam Fabric Corporation

We often wonder whether Mr. and Mrs. Average Theatregoer are conscious of the changes that have taken place in recent years in their favorite theatre. It was not so long ago that the local theatre or movie house was a mighty drab affair. The side and rear walls were merely covered with a coat of flat paint, and, as for the stage, a painted olio curtain for presentations, advertising the wares of local merchants, was the last word in decoration. For the movies, all that was used on the stage was a black masking around the screen.

SOUND MAKES THE THEATRE

We hate to think so, but this could have gone on indefinitely if it had not been for the advent of talking pictures. That revolutionized everything, as the installation of sound equipment in theatres throughout the country gave both the sound engineers and the theatre owners plenty of headaches. The motion picture industry discovered that, although a modern miracle had been achieved in projecting sound, synchronized with the action on the screen, still left plenty of kinks to be ironed out. The biggest problem was the unexpected behavior of the sound waves. They came out of the loud speaker, located just under the picture screen, right on schedule, but then all semblance of law and order seemed to cease. Some waves sneaked across the stage and out of the back door. Most of them zoomed into space, danced off the side walls and kept on going until they crashed into the rear of the theatre at which point they were thrown back at the patrons, causing echoes and speech distortions. However, Hollywood's sound engineers quickly solved the problem. Acoustical changes, by the use of fabrics in the theatre, were the answer, and here is how it worked.

Backstage

Experiments proved that the hanging of a large semi-circular curtain immediately behind and around the screen, prevented the sound waves from going every which way, and kept them on a straight and narrow path. This large curtain, called a cyclorama, is usually made of a soft absorbent fabric, such as velour plush, heavy crash, rep, or similar fabric, which, by virtue of construction and texture, have become standard materials in acoustical treatment.

Proscenium

Working away from the screen, the next was to drape the entire stage. A deep valance, in lavish fullness, was hung from the proscenium arch, giving the decorator ample leeway to utilize his talents. To complete the project from a decorative angle, a front curtain, usually a traveler, was hung from a track running above and behind the proscenium arch supplemented on either side by a pair of legs and a border across the top. Here again the architect and consulting decorator really went to town, making use of their art and ability to create beautiful effects. The front curtain, in use only when the house lights were turned on, was the piece de resistance of the decorative scheme. High-pile silk and rayon velvets, plushes, damasks, and satins, in both plain and beautiful patterns, were chosen for their richness and luster. These lush fabrics, their natural richness enhanced by beautiful lighting effects, transformed the old "movie" into a place of glamour and beauty.

Auditorium

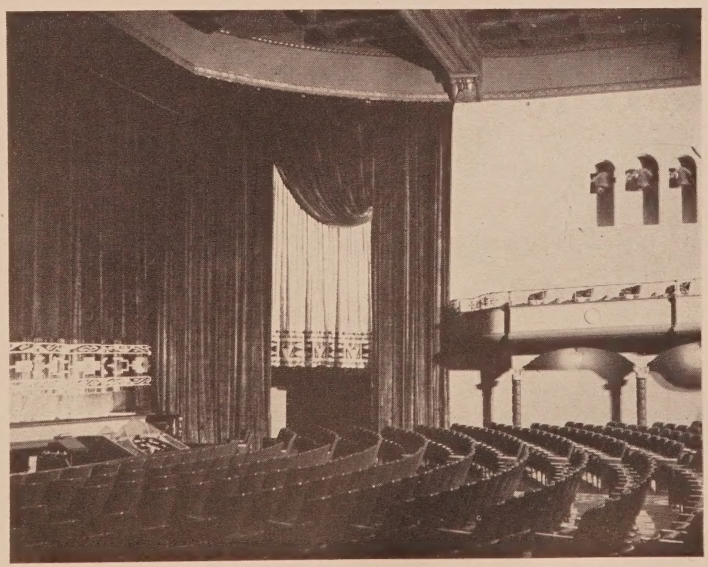
Further liquidation of acoustical gremlins eliminated the echoes and speech distortions by covering the side and rear bare walls of the theatre with a material which absorbed the sound waves, just as a blotter absorbs ink. The most successful method was the use of rock wool, which possesses wonderful insulating properties. Cotton felt was also used where the acoustic condition was not too acute. To cover the unsightly rock wool or felt, it was necessary to use a decorative fabric which would further the absorbent treatment and, at the same time, beautify the theatre. These are not just ordinary, prosaic, everyday fabrics which, even in the half-light of the theatre, stood out in bold relief. Patterns which were strictly theatrical in design and coloring, which no one but a highly specialized theatrical textile designer could have the vision to create and execute.

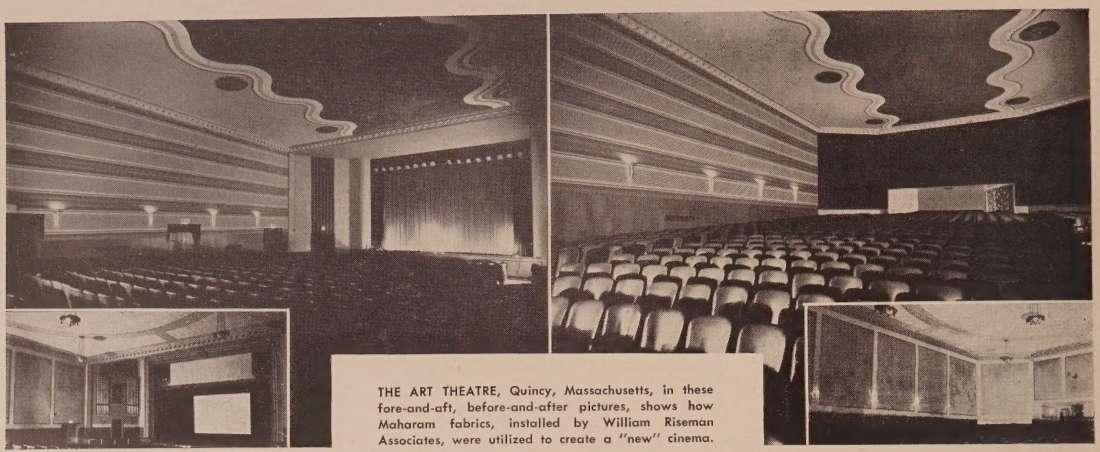
Lobbies

In recent years, lobbies have been considered almost as important as the interiors, bearing the same relation to a theatre as a foyer does to a home. If the lobby is unattractive, the desire of the public to patronize the theatre is, to a great extent, destroyed. A beautiful lobby, decorated with interesting fabrics, will create a considerable passer-by interest.

In many cases, the lobbies have been given the same treatment as the interior theatre walls; namely, a large or small motif damask, dependent on the size of the house, or a plain drapery fabric of a rich texture, either drawn taut or draped in pleats.

THE COMING OF SOUND made theatre operators acoustic-conscious and, that patrons might hear, as well as see, as well as possible, draperies came into their own. Seen in this Maharam Fabric Corporation photograph of a theatre in southern Illinois is the use of hangings for the purpose of improving the acoustic characteristics of the auditorium, as well as to cover up stage boxes and organ grilles which were no longer needed.





THE ART THEATRE, Quincy, Massachusetts, in these fore-and-aft, before-and-after pictures, shows how Maharam fabrics, installed by William Riseman Associates, were utilized to create a "new" cinema.

Other Places of Use

Since the use of fabrics was the obvious answer to their problems, theatre owners throughout the country were quick to realize that, in addition to its proven utility value, the use of proper fabrics in theatre interior decoration undoubtedly has done a great deal towards making the theatre a very pleasant and restful place in which to spend an evening and the most important medium of entertainment for our American communities. Fabrics have also been used to create warmth and beauty in men's and women's lounges, which, in recent years, are given as much attention as other parts of the house. Special fabric effects have been used above standee rails combining a decorative purpose and utility one, namely keeping out noise and drafts. Bare, uninteresting box offices have been beautified by the use of interesting materials, such as small motif damasks, satins and casement cloths. In the silent theatres converted to sound, organ grilles were covered with sheer, shimmery, rich fabrics of porous texture, to permit the sound to come through easily.

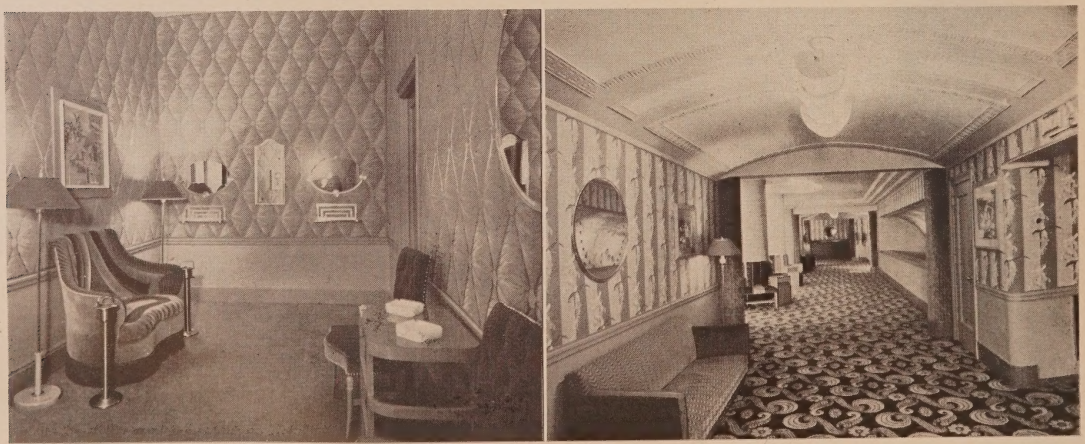
PAST, AND FUTURE

For the past 50 years fabric manufacturers have been working in close association with the country's leading architects and scenic studios, executing ideas for the interior decoration of our world-known cinema houses, theatres, night club, and so forth. The industry can take pardonable pride in the many beautiful damasks, plushes, velours, and the like, that have been created and woven and that are now gracing the walls and stages of thousands of theatres throughout the country. Through the years solution has been found to many unusual problems, such as having a damask made of the same motif as the carpeting of a theatre and to designing a fabric to carry out the theme of an intricate Indian design, and so on.

And so with this experience, accumulated over the past years, the industry is now engaged in weaving damasks and novelty fabrics for the new modern trends, utilizing the many new yarns that have been developed recently, such as glass fibres, nylon, better types of rayon, and the like, thereby obtaining many new effects and textures. There is still a great deal of research being done with the new yarns, and such materials will be used as soon as they become available.

The theatre-going public is taking more and more recognition of these changes in theatre decoration, and enjoys being surrounded by the same glamor and atmosphere they find in beautiful night clubs, homes, and moving-picture sets. With World War II behind us, and with its restrictions rapidly becoming a thing of the past, fabric makers are again consulting with the many scenic studios and designers for the express purpose of creating designs and fabrics which will beautify theatre interiors. The post-war period will see the execution of a great deal of work in this field.

THE MERRICK THEATRE, Jamaica, Long Island, New York, shows further use of fabrics in the modern theatre, for their decorative as well as acoustic effectiveness. At the left is the ladies' lounge with a wall treatment of Trituft damask. At the right is the promenade, showing other wall-fabric treatment. The Maharam Fabric Corporation furnished all the fabrics used, as well as the Swirl plush front curtain for the proscenium opening. The architects were John and Drew Eberson.



Dividends Are Paid in Textile Progress

New Fabrics and New Uses Share Spotlight Because of War's Demand for Better Fibers

From the first, American theatre operators have been conscious of the part textiles play in making the theatre a point of attraction. From the time he covered the bare, unsightly walls of converted stores, added stage drapes and curtains, and put in upholstered chairs and lush carpets, he has been in the fore-front of the users of fabrics in all forms for artistic embellishment. During the last five years, theatre operators have not been able to carry on, because fabrics, like everything else, had been drafted to do its share in prosecuting a war to its successful conclusion. Despite the war, fundamental developments have come to pass.

NEW FABRICS FOR OLD USES

The wide variety of materials that are now being used experimentally or commercially for the production of fibers indicated that textile fibers are made of almost everything, natural or synthetic!

Here are a few of the current developments.

NYLON

War demands have resulted in such a tremendous expansion in the manufacture of nylon that a post-war production of some 23,000,000 pounds is anticipated. Not all this production, however, will go into hosiery, for the manufacturer, the E. I. duPont deNemours and Company, Inc., will make this versatile material available for other useful and decorative applications. Where nylon will especially pioneer is in hangings, upholsteries, slip covers, curtains, and rugs—heavy fabrics with various finishes which give softness, water repellency, and resistance to crushing, snagging, and burning.

The work done on draperies and curtains, however, has been very limited. Sample fabrics in marquisette weaves, as well as in net and lace, have been made. Lightness of weight, sheerness, and the setting of the fabrics to maintain a clarity of weave or construction contribute to their acceptability. Nylon with the much-desired crinkle effect of typical French hand-looming can be used for slip covers, brocaded drapes, and light, strong rainwear.

The use of nylon in pile fabrics was first used to replace silk as the backing yarn in a transparent velvet, and later it was tried as the pile yarn. Experiments and samples seem to indicate that an inherent moth-proof, crush-proof nylon velvet is a distinct possibility.

One or two small trials showed that nylon could be permanently embossed and set to simulate various types of fur.

Experimental rattan on chairs, after more than two years of all-weather, outdoor exposure, was still smooth, easy to clean, and retained its coloring.

Nylon rope is less susceptible to water, tougher and stronger than Manila hemp or sisal.

There are, of course, probably many fabrics which can best be made by using nylon in combination with rayon, wool, cotton, silk, or other fibers. While there has been practically no work along this line up to the present time, the future possibilities are many and cannot be ignored.

RAYON

The American rayon industry is one-third of a century old, and seems destined to continue its expansion and to improve the quality of its products.

Rayon crepe, developed in 1927, opened up one of the largest fields for the fiber. Not only was it found that viscose rayon would crepe satisfactorily, but it could be given a deeper pebble and a greater variety of crepe effects than is possible with silk.

Viscose rayon yarn with a bright luster is used for making satins, brocades, damasks, and other weaves used in upholsteries. Semi-dull viscose rayon goes into bengaline, faille, various crepes, and other weaves where a subdued tone is desired.

A comparatively new development is Fiber G, which does not lose its strength when wet. This is still in the experimental stage, but a small volume has been used commercially.

The use of rayon staple has broadened the textile field considerably. Today rayon staple is employed in carpets and rugs which have the advantages of being naturally moth-proof, rather dirt-resistant, and available in a range of attractive colors. However, rayon pile does have the serious drawback that it is not as resilient as wool and, consequently, footprints have a tendency to hang around.

Acetate lends itself well to special finishes, such as moire, in which a permanent finish—never possible with silk!—is molded into the fabric, and to embossed patterns and permanent pleats. Acetate satins achieve a smooth hand.

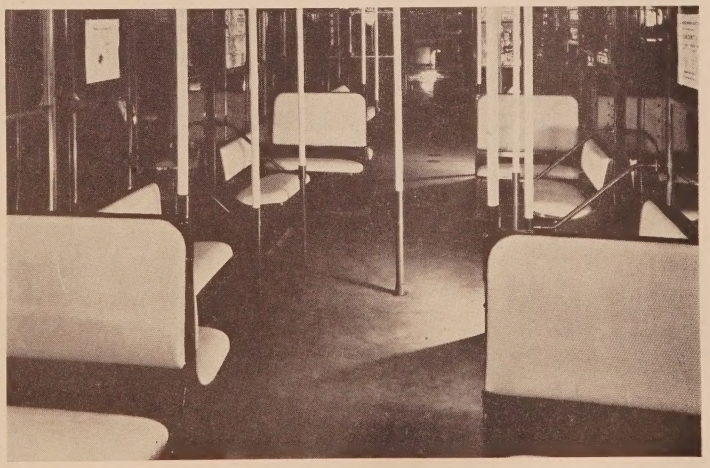
Industries confronted with a lint problem adopted fabrics of acetate rayon for uniforms of the light-weight, sharkskin type and for use as wiping cloths.

The use of acetate staple, either alone or blended with other fibers, such as wool, cotton, and viscose rayon, is expanding, offering a broad field for improving the hand and wrinkle resistance and for reducing the shrinkage and stretch. Fabrics of 50-50, acetate-wool blends have been used. Blends of cotton and acetate staple have been produced, with a 35-65 mixture being widely used.

Cellulose acetate, in both yarn and fabric forms, is used extensively in electrical insulation, as coating with various waterproofing compounds is possible.

Rayon staple developed by DuPont, and produced in either straight or crimped form, has been experimentally woven into

FURTHER TESTIMONY on the ruggedness of Saran fabrics is supplied by this Dow Chemical Company photograph, showing a New York subway car re-upholstered in the new plastic fabric. If Saran (a vinylidene chloride plastic) is able to "take it" under these conditions, notoriously hard on any upholstery material, it should lend itself to extensive use not only in theatre chairs but for any upholstered furniture used.



rugs resembling sisal but less harsh. Furniture could be covered with rayon staple weaves. It could give interesting effects to draperies and seat covers.

The Celanese Corporation of America has a saponified acetate rayon yarn, Fortisan, which is one-eighth the size and weight of silk, yet has three times the tensile strength of that natural material! Post-war applications include belting and webbing.

Yarns of cellulose acetate butyrate, introduced in 1941, are attractive and the finished woven material has a permanent jewel-like luster, lending itself to possible theatre use as ornamental trimming.

VELON

Velon, manufactured by the Firestone Tire and Rubber Company, can be drawn into threads for weaving fabrics. Toughness, strength, resistance to attack by fungi, chemicals, or solvents are some of the properties which have made it useful for many applications. It is also practically scuff- and wear-proof. Moths, termites, and rodents avoid it. It sheds water. It is non-combustible. And, with a minimum of cleaning effort, it continues to look bright and new. Velon's greatest outlet should be in upholstery, where, short of actual vandalism, accident, or downright carelessness, it should outlast the furniture on which it is used.

Special service ropes and cores for wire ropes have been made from extruded Velon material.

For new styling, color combinations, and designing for the future, Velon braid has possiblities of trimming of all kinds.

A water-resisting voile, of similar origin, has been announced by the Athol Manufacturing Company. The material, weighing only two ounces to the square yard, is used by the Navy.

VINYON

First produced commercially in 1938, Vinyon (trade-mark of the Carbide and Carbon Chemicals Corporation) found varied uses both as a staple fiber and yarn. Upholstery fabrics, experimentally woven from Vinyon fibers appear well suited to the manufacture of waterproof goods and fireproof fabrics for curtains and drapes in public buildings.

Vinyon can be made to acquire considerable elasticity. In some cases, these yarns (Vinyon E) have been used to replace United States Rubber's Lastex. The American Viscose Corporation has produced a similar elastic yarn with a stretchability up to 400 per cent, with a 100 per cent recovery. This product has a pleasant feel and can be used for tapes, webbing, cords, and all general uses for rubber-elastic yarn.

SARAN

The Dow Chemical Company developed Saran as a basic plastic raw material which, while well adapted to other plastic uses, has far-reaching significance in giving strength and durability to upholstery and forming colorful, fireproof fabrics which are also resistant to wear and chemicals, and making rust-proof screening and rot-proof rope.

SARAN, product of the Dow Chemical Company, is a plastic which can be drawn into fibers and subsequently woven into cloth that is strong, durable, and fire-proof. As upholstery material, it has possibilities.

Woven Saran fabrics are suggested where extra durable textiles are needed. Heavier filaments, medium rattan-shaped, are used for upholstery materials. Saran filaments are also used with common materials, like cotton, to give special effects, color, and texture to finished products. Shrinkage, however, will be encountered in unrestrained filaments at elevated temperatures. Accordingly, Saran fabrics should not be boiled.

PROTEIN FABRICS

Interest in the formation of artificial fibers from proteins has been stimulated by the war, as well as by favorable developments since it was shown (1935) that usable fibers could be made from casein. Fibers have been made from a variety of proteins—including collagen, keratin, egg albumin, gliadin, casein, and blood serum, and from protein material from soy beans, cornmeal, peanuts, tobacco, and pumpkin seeds, and certain fish. So far, however, no fiber has been reported with qualities comparable to those of such natural protein fibers as silk and wool. Up to the present time, the three proteins from which fibers have been most successfully spun are those from milk, soy beans, and cornmeal.

Casein Fibers

Casein fiber has been of considerable interest since the Italian product, Lanital, was developed a decade ago. As a wool replacement, it has been extensively produced in Europe, being known as casein fiber in Great Britain and as Tiolan in Germany. Before the war, Italy was the largest producer of the material. In this country the casein fiber, Aralac (trade-name of the National Dairy Products Corporation), has enjoyed large-scale production, the present output being about 9,000,000 pounds a year.

These fibers have the characteristic spring, resilience, absorbence, and warmth of wool. They can be readily blended with wool, mohair, cotton, rayon, or fur in varying proportions, and are less expensive than any of these materials. Lack of strength is their one important drawback.

When blended with rayon, these fibers improve the hand of the fabric, add warmth, resilience, and wrinkle resistance. One of the oldest markets for casein fibers is the felt-hat manufacturing trade, where the material is blended with wool and rabbit's hair.

A recent development is a casein fiber said to be finer than any wool, resembling either vicuna or cashmere.

Soybean Fibers

A new plant has been opened for the development of soybean fibers to the point of commercial production of carded and drawn yarns. War retarded the progress of this work, but developments have been going on which are concerned with increasing the wet and dry strengths of the fiber, improving resistance to chemicals, and developing special fibres for blending with rayon, cotton, and wool. Successful mill tests have been run on 50 per cent blends being used for felt, carpeting, and other purposes.

Keratin Fibers

Fibers resembling silk and wool in some of their properties have been made experimentally on a limited laboratory scale from keratin, the protein from chicken feathers, at the United States Department of Agriculture's Western Regional Research Laboratory. It is possible to make these fibers in dimensions varying from the diameter of spider webs to that of heavy gut strings. The main problem now is the improvement of the wet strength. Through recent developments in tanning procedure, it has been possible to improve this deficiency to a marked degree. Much study remains to be given chicken-feather-keratin fibers and fabrics before its usefulness can be fully realized.

Miscellaneous Fibers

Peanut-protein fiber is another wool substitute.

The zein (corn-meal protein) fiber can be spun into yarn, using much the same procedure as with rayon. Although this material is still experimental, producers indicate that it has satisfactory resilience, elasticity, and wet strength.

Although not protein, mention should be made of experimental fibers produced from the bark of the California redwood. These have been used in manufacturing blends for wool suitings.

GLASS FABRICS

Glass fibers, comparable to nylon, Vinyon, and Velon in their resistance to deterioration by moisture and chemical and biological agents, have the added advantage of greater resistance to heat, making them particularly valuable for use in electrical insulating braids and industrial clothes. All-glass clothes provide a high concentration of fibers, and are usually used in reinforcing material when high strength is desired.

Following tests of wear and tensile strength, dimensional stability, and general durability, Transcontinental and

Western Air, Inc., recently adopted a Neophene-coated Fiberglas as the supporting fabric for seats in its Stratoliner planes (also used by the Army as C-75 transports) and for crew bunks in the C-54 passenger and cargo planes. (Neoprene is a type of synthetic rubber, developed by DuPont; Fiberglas, product of the Owens-Corning Fiberglas Corporation.)

TWA reports that tests and experience with this material showed better results than obtained with other materials under consideration.

Drapery fabrics are now available from Thortel Fireproof Fabrics which are non-flammable. They are of Fiberglas, and are proof not only against fire, but against moths, silverfish, mildew, and sunlight as well. In addition they can be cleaned without shrinkage.

A recent development is Fiberglas made into non-combustible blankets with excellent heat and sound insulating properties. This new product could be utilized in sound control methods in the motion-picture, radio, and television industries.

Fiberglas mats are now used as wrapping for underground pipelines for protection against electrolysis and corrosion; as a base for a plastic laminated material; and as a base material for gaskets and sheet packing.

Another glass material to be mentioned is Foamglas, manufactured by the Pittsburgh Corning Corporation. Its imperviousness, plus its thermal characteristics, has made it a material to be considered for the insulation of theatres.

ASBESTOS FABRICS

Mountain leather, or paligorskite, a rare type of asbestos, is now available and adaptable to sound-proofing and shock-absorbing uses. Discovery of a deposit near Glacier Bay, Alaska, led to experiments by the United States Department of the Interior's Bureau of Mines on its commercial use in lightweight, acid, and fire-proof products.

New applications are anticipated by the United States Rubber Company for its asbestos textile now being used for military fire-fighting suits and insulating tapes for cable. Fabrics from this asbestos yarn are extremely light weight.

Asbestos is combined with glass by the Owens-Corning Glass Company to make a new textile cloth which has light weight, high abrasion resistance, and resistance to corrosive fumes and high temperatures.

Asbeston, developed by United States Rubber, is a cloth-like material made from fibered asbestos. After the war, it will go into such articles as fire-proof upholstery for theatres and public places. Asbeston can also be made waterproof and impervious to oil and gasoline.

METAL FABRICS

Aluminum

Aluminum yarn will be made into various products after the war. The product can be coated to give added tensile strength, with colors added during the coating process. The yarn is said to be washable and non-tarnishing. It may also be used as formed or twisted around cotton or rayon.

One type of aluminum cloth, in which the Aluminum Company of America is indirectly interested, is manufactured by the A. M. Tenney Associates. This definitely post-war product, named Kodapak, lends itself to decorative purposes in drapery and upholstery cloths. In spite of the fact that the yarn does contain metallic aluminum, it is not fire-proof. It does burn much slower than other fabrics, but Kodapak, in its present state of development, could hardly be expected to replace fire-proof or fire-proofed textile materials in theatres.

Metallic yarn, woven into fabrics directly or combined with cotton, wool, or rayon, will soon be ready as the result of a Reynolds Metal Company process.

Stainless Steel

Stainless steel of the famed 18-8 composition has been woven into cloth. While the coarser meshes would make non-rusting screen, the finer weaves are too stiff—and much too expensive—for service in the theatre, even in the near future. The W. S. Tyler Company has such cloths for special purposes, where the demands for a stainless steel fabric makes price an insignificant factor.

Other Metals

Wire cloth, as fine as 400-mesh, has also been woven from phosphor bronze, Monel, and nickel. When more information is acquired, the metallurgical industry may change its present opinion on the possibilities of wire cloth in the theatre.

NEW USES FOR OLD FABRICS

As every theatre owner knows, natural fabrics absorb water, shrink, crease and wrinkle, rot and mildew, are eaten by insects, and they wear out—all in a relatively short time. It is small wonder then that America's scientists have felt

FIRST SCHOOL AUDITORIUM STAGE in the United States to have fire-safe Fiberglas curtain and backdrop is that of the VonSteuben High School, Chicago. Stirred by potentially tragic effects of several school auditorium fires in the Chicago area, school authorities installed jade green curtains and backdrop of incombustible glass yarns. The auditorium's window curtains are also made of jade green Fiberglas. Theatre owners throughout the country are considering more and more the use of such material in theatres. This photograph is used through the courtesy of the Owens-Corning Fiberglas Corporation Thortel Fireproof Fabrics.

WOVEN STRIPS of Vinylite plastic sheeting form durable backs and seats for chairs. The material (made by the Bakelite Corporation) never gets shabby and is cleaned with a damp cloth. It is comfortable.

that Nature could be improved upon.

These aspects of the textile problem were among the first broached by developers of military textiles. From their researches have come some of the most valued contributions, although to the theatre operator they may not be of too great or too immediate value.

WATER-PROOFING

There are two broad divisions of water-repellent chemicals. One includes the wax-aluminum type of emulsion (like Aridex, of the E. I. duPont deNemours and Company, Inc.), which forms a thin film on the fibers of the cloth. However, it comes off when the fabric is laundered or dry-cleaned and must be renewed after each cleaning. The second type (represented by Zelan, also developed by the duPont company) is a durable water-repellent material applied to the fabric before it is put to a final use.

The Shirley Institute has developed a new type of cloth which becomes more resistant as it gets wet. When such fabrics (such as the Army's Jo-clothes, a close-weave Oxford cloth) are wet, the fibers swell, and the cloth becomes less pervious to water.

It has been said that the General Electric Company has a method whereby cloth, paper, or other material is rendered water-proof following exposure to the vapors of a new chemical compound.

In the insulation field, water-proofing is sometimes desirable. The Monsanto Chemical Company has succeeded in waterproofing Santocel (developed by General Electric) with one of the silicones (silicon resins).

SHRINK RESISTANCE

Textile scientists consider shrinkage their most serious problem. Shrinkage may result from either the relaxation of the fabric or from felting.

The Sanforizing process—for the discovery and development of which Sanford Lockwood Cluett, vice-president of the Cluett, Peabody and Company, Inc., has been awarded the Longstreth Medal by the Franklin Institute—is applicable to all cotton fabrics, but not to woolens and rayons. Some decorative fabrics were being Sanforized before the war, but they were predominantly cotton.

Impregnation of the fabric with certain resins has been employed on cottons and rayons.

Three processes have been developed by Monsanto Chemical for treating fabrics without impairing the desirable qualities of the basic fibers. The Syton treatment removes the shine on serge, prevents runs in sheer materials, and adds life to the fabric. Reslooming makes woolens shrink-proof, wrinkle-proof, and more durable. The third process, yet unnamed, is said to impart water-repellent qualities to cotton, rayon, and wool.

Lanaset, developed by the American Cyanamid Company, stabilizes wool and wool blends, without affecting their absorbency, and reduces felting upon laundering, and prevents pilling and fuzzing.

Other resins and chemical are being made to do additional textile jobs. One is a treatment to make organdy fabrics soft or crisp, transparent or non-transparent. DuPont's Lucite may perform a new kind of practical and decorative function in providing snag-proof sheers.

MILDEW-PROOFING

Humidity promotes the growth of mildew, one of the most destructive enemies of cloth and textile raw materials. Although a wide variety of fungicide is known, relatively few are suitable for use on fabrics.

Copper compounds have had wide application for this purpose. Copper nephthanate has been extensively used. Although copper ammonium fluoride is not in the same class with copper napthenate, because of its solubility in water, it has been used where leaching is not a factor to be considered.

Zinc compounds are not as toxic as those of copper, but they have been used on items where copper might prove undesirable.

The fungicidal properties of mercury compounds has long been recognized, but their use has been limited because of their toxicity to humans. However, some of the phenyl and pyridal derivatives (of which, for not dissimilar purposes, duPont' Semesan and Ceresan are classic examples) appear promising.

Acetylated cotton, as developed by the Southern Regional Laboratory of the United States Department of Agriculture, is not attacked by soil micro-organisms or mildew.

Phenolic compounds, particularly the chlorinated ones, have been used with success. A newer development in rot preservatives for cotton fabrics is phenyl mercury oleate, which is odorless and does not cause stiffening or tackiness of the fabric, is non-volatile, and is not leached out.

One of the best chemicals for textile treatment is the so-called DDM (dihydroxy-dichloro-diphenyl-methane, a close relative of famed DDT). It is harmless to men and materials.

MOTH-PROOFING

The moth-proofing of carpets, clothing, and upholstery is now a fairly established process, involving a spray or dip with one of a number of chemical compounds, many of which contain fluorine.

An interesting approach to the moth problem is the changing of the structure of the wool itself to make it less edible to moth larvae. This "built-in" moth-proofness is still in the experimental stage and is not being applied commercially.

FIRE-PROOFING

Only within recent years have chemicals been developed which are easy to apply and do not affect the appearance and feel of cloth.

Ammonium sulphamate (also valued as an eradicant for poison ivy) has been employed for flame-proofing draperies and cutains in theatres and other public-gathering places.

Impregnating fabrics with a mixture of antimony oxide, Vinylite VYHH (a product of the Bakelite Corporation), and methyl-ethyl-ketone imparts fire resistance to cotton and wool.

A new invention, which not only fireproofs but also water-proofs, employs an aqueous solution of iron acetate. In the drying, the iron acetate base is precipitated in the fiber or cloth and then a fire-retardant—such as a non-volatile chlorinated compound—is introduced.

Chlorinated paraffin, with antimony oxide, has been used to flame-proof where ammonium sulphamate is not suitable of its water solubility.

Chlorinated rubber is odorless and non-flammable. Parlon, manufactured by the Hercules Powder Company, is a material of this type, and has been used in flame- and water-proofing finishes for fabrics.

A new non-smoldering, fire-proof upholstery material has been introduced by the United States Rubber Company.

Some fire-proofing treatments are also combined with mildew-proofing.

LAMINATED FABRICS

Applications of plastics to the outer surface of fabrics is not new; but, as in the making of oil cloth and rubberized raincoats, they changed the appearance and feeling of the cloth. The new method is to use vinyl butyral—a plastic previously used as an interliner in safety glass—and the invisible coating is so thin that its presence can hardly be detected. Typical of the available products are Monsanto Chemical's Saflex, Shawinigan Products Corporation's Butvar, duPont's Butacite, and Bakelite's Vinylite X.

Of interest in the commercial production of laminated fabrics through the utilization of cellulose acetate rayon yarns. In the process, the fabrics are made to adhere to a third fabric containing the rayon, which is placed between the other two. At the completion of the process, there is a marked stiffening of the composite fabric, due to a solidification of the adhesive. This process is used commercially for the production of "wrinkle-free" collars and other items.

For artificial leather—also called simulated leather or leather cloth—the usual bases are cotton fabrics of various weights and textures, depending on the type of article to be manufactured. Fabrics of the heavier grades, such as sateens and flannels ("moleskins"), go into upholstery and leather goods. Artificial leather combines toughness and beauty. Such nitro-cellulose-coated products show resistance to flexing, folding, cold-cracking, abrasion, fire, and other agencies. As a post-war possibility, duPont suggests that artificial leather based on a nylon fabric should interest the manufacturers.

COATED FABRICS

Many materials were developed to meet the storage of rubber and other materials, but it seems likely that they will stay despite the inevitable return of natural rubber and the lifting of other war restrictions. Before the war, lacquer-type coatings were widely used, but current researches have largely excluded the standard type of pyroxylin coatings, because other special properties were required of the coated fabrics.

Plexon

Plexon is an impregnated and coated yarn, employing one of the standard fibers as a base or support. It is manufactured by Freydberg Brothers-Strauss, Inc., with the weaving into cloth being done by the Merlang Manufacturing Company. From the economic point of view, these fibers have not always been the most expedient materials. However, the company claims that the increased production capacity and lowered price of the plastic will greatly reduce the cost of these yarns and enable them to compete with synthetic fibers.

Paraplex Resin

Tent cloth has been developed which, through the use of the new Paraplex resins (products of the Resinous Products and Chemical Company), wears longer, has greater strength, and resists weathering and fungi better than pre-war duck. The compound in which the cloth is bathed makes it water-proof by sealing the relatively open weave. By acting as a binder for the flame-proofing and fungus-proofing agents, it protects against fire and deterioration. From its early experiences in making both cloth and artificial leather, the L. E. Carpenter Company, in cooperation with Resinous Products and Chemical, devised this type of application.

Tolex

One of the war-proved materials is Tolex, developed and manufactured by the Textileather Corporation. This plastic leathercloth combines colorful smartness with wear-resisting toughness. Tolex is available in many colors and Leatherstone patterns and finishes. Tolex is easy to clean with a damp cloth or cleaning fluid. It has shown outstanding ability to resist flexing, abrasion, acids, alkalis, fire, folding and many other destructive forces. Post-war uses for Tolex include upholstery interior decoration, and "leather" goods.

Terson

Terson (registered trade-mark of the Athol Manufacturing Company) is a formulation for coating cotton, rayon, nylon, and other fibers. The resulting Terson fabric possesses flexibility at high and low temperatures, water resistance, fire resistance, and toughness. There is no practical limit to the number of shades in which Terson may be manufactured, it may be embossed with a pattern, and its finish is smoother than that of pyroxylin, with surface blemish reduced to the vanishing point. War has proved its utility as an upholstery fabric. On a nylon base, Terson is of excellent texture, particularly free from knots, slubs, and fuzz; of strength and high tear resistance; and light in weight, water-proof, and flexible. As a base, rayon is also serviceable. Airplane and balloon clothes assume new uses as bases of Terson fabrics.

P. C. Cavalon

P. C. Cavalon, made by DuPont, consists of a flame-proofed cotton-cloth base, with a flexible, fire-resistant coating of synthetic resin. The new pliable upholstery material will be available in a range of colors, grains, and finishes when war demands are met.

Fabricoid

Another DuPont product, well-established for years, is Fabricoid, which will doubtless continue to be an all-around upholstery material for padded seats and cushions of medium depth.

Fabrilite

Plastics have been used to coat and impregnate fabrics, called, by DuPont, Fabrilite. They are flexible, light-weight, and unusually tough. The materials are also resistant to stains, moths, abrasion, cracking, stretching, and shrinking, and afford a high protection against cold, wind, and dust. However, the fabrics are expected to be utilized mainly in protecting clothing, such as raincoats and capes.

Koroseal

The B. F. Goodrich Company's Koroseal compounds are distinguished by extreme toughness and long flex life. They are non-toxic and will not support combustion. The material can be applied to cotton, silk, viscose rayon, wool, felt, asbestos, and glass-fiber cloth for industrial and other uses. Other representative products in this general group are General Electric's Flamenol and Goodrich's Plioflex.

Zapon and Keratol

A post-war demand for theatre-seating upholstery will probably obtain for the Atlas Powder Company's pyroxylin coated fabrics, Zapon and Keratol.

Silastic

While not a fabric coating at present, Dow Corning Corporation's Silastic is a silicone rubber to be used as an insulative coating on various materials, including metals and glass or asbestos cloth. Silastic produces flexible, water-proof, heat-stable, oil-resistant gaskets, diaphragms, tapes, and electrical insulation.

THIS DURABLE, ATTRACTIVE-LOOKING SEAT has been made more long-lasting by a cloth and Vinylite plastic combination. The cloth is coated with a flexible Vinylite plastic coating and is, consequently, resistant to wear, oils, and dirt. In one test, this particular seat was subjected to hard driving in a taxicab, but it showed no signs of wear. The Vinylite plastic is a product of the Bakelite Corporation, which furnished this photograph.

Use of Black Light Modernizes Theatres

Judicious Use of Invisible "Light" Rays Makes Any House Shine with a New Lustre

By J. Cornell Richardson
President, Black Light Products

"What can I do to make my theatre more glamorous?" Wise exhibitors are asking themselves this question over and over again. One good answer is, "Use outstanding decoration." The exciting tempo of modern living is reflected in a recent trend toward more color and better color. Naturally, places frequented by the most people—such as night clubs, hotels, and theatres—are first to respond to this popular demand for more vivid colors.

"How will my theatre compete?" Theatre owners are especially interested in keeping up with current trends, because their patrons expect to see rich-looking, truly luxurious interiors. Yet, in the average theatre, limitations of patronage coupled with low admission prices make frequent decoration impractical.

NEW EFFECTS CREATED

Black light creates new and lasting dramatic effects of breath-taking beauty, which are within the reach of any exhibitor. The transformation that occurs as the houselights fade is beyond description. Mural designs which seem like regular pictures or patterns when viewed in ordinary light, contain special paints that emit soft, glowing colors when submitted to the invisible rays of black light. All the colors of the rainbow radiate with an unearthly beauty delighting and mystifying theatre audiences.

No longer does the interior of the auditorium look like a hole in the wall. No longer do patrons stumble and fumble trying to find seats. No longer do they disturb others unnecessarily. But best of all, correctly installed black light tends to relieve the eye strain sometimes associated with the glare of the screen by distributing the light more evenly. Yet it imparts such a delicate luminescence that it does not detract from the projection of the movie. Moreover, when the novelty has worn off, it still imparts the atmosphere of luxury and magnificence, so necessary to a successful modern theatre.

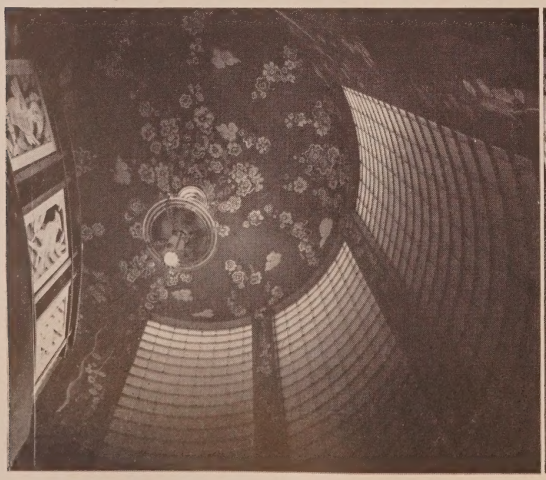
"Will these designs make my theatre look smaller?" On the contrary, to create the effect of depth on a flat wall, paint the surface of the wall with blue fluorescent paint, then apply a design or figure over it in the foreground, and highlight that design with amber or gold fluorescent paint. This treatment will make the flat wall look like a niche with a piece of three dimensional statuary in it. A theatre so decorated will actually look larger.

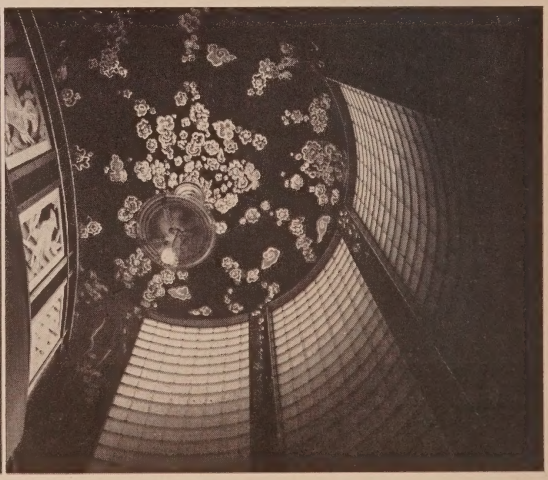
Rich fluorescent satins come in colors to match the paints. Combined with side wall or ceiling murals, they produce harmonious, unusual and individual effects. Luminous patterns can be painted on this fabric, or on any ordinary cloth, with special fabric solution or the same paint used on murals. It is possible to decorate velours and heavier materials, too.

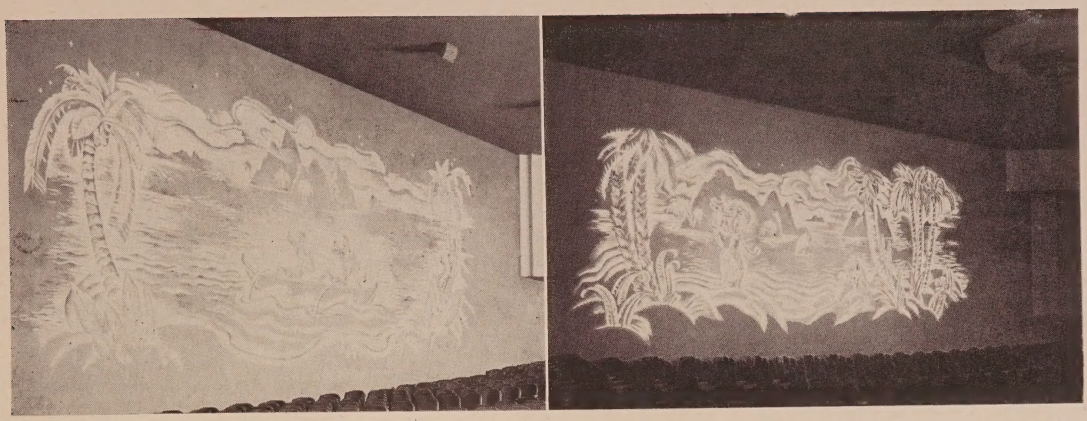
Seasonal decorations may be secured for Christmas, New Year's, Easter, or any other special day. For instance, glowing American flags are now available. They provide a truly unique treatment for Fourth of July and other patriotic holidays which always brings a gasp of admiration from spectators. The theatre displays one of these American flags on each side of the proscenium arch. Then the auditorium darkens, the "Star-Spangled Banner" starts playing and the flags shine impressively. An individual electric fan focused to make the flags ripple will heighten the effect. The decorative uses of black light are limitless.

Use of luminous carpet makes it especially easy for patrons to find their ways up and down theatre aisles. It marks the aisle clearly, yet much more evenly than the present method of installing white lights on the sides of seats. The designs of the carpet are woven from fluorescent yarns, so that the effect lasts as long as the carpet. Painting regular carpets is impractical as the fluorescent paint wears off too quickly when walked upon.

ON CEILINGS, TOO, fluorescence can play a part in the decorative scheme, as shown in this pair of photographs, taken before (left) and after (right) a ceiling design had been re-worked with pigments which fluoresce under the influence of the ultraviolet rays of black light. It is obvious that sort of treatment could be effective in domed foyers or high-ceilinged lobbies. And, in conjunction with a decorative scheme which considers walls and ceiling as a complete entity, many fascinating effects could be achieved. Indeed, the all-over plan of things could be made to include all parts of the theatre, including the carpets and other floor coverings. The startling effects are obtained through the use of pigments and colors which, under the influence of ultraviolet faling withing certain wavelength limits — the so-called black light, since it is invisible to the unaided eye — glow in a seemingly miraculous manner and appear to be self-luminous. The three sets of comparison photographs are from the files of Black Light Products and have been reproduced here through the courtesy of that same company.







AUDITORIUM WALLS make logical place to utilize fluorescence in the decorative scheme of the theatre. At the left is shown a design painted in the usual manner and it is, of course, part of the decorative scheme only when the house lights are up. At the right is the motif reworked, using pigments which are activated into fluorescing by black light. Thus the decorative pattern of the theatre is innocuously present at all times. When the feature picture is on the screen, there is no annoyance because of the wall decoration but rather it emphasizes the fact that one is in the theatre, not in the middle of a black nowhere.

INSTALLATION OF BLACK LIGHT

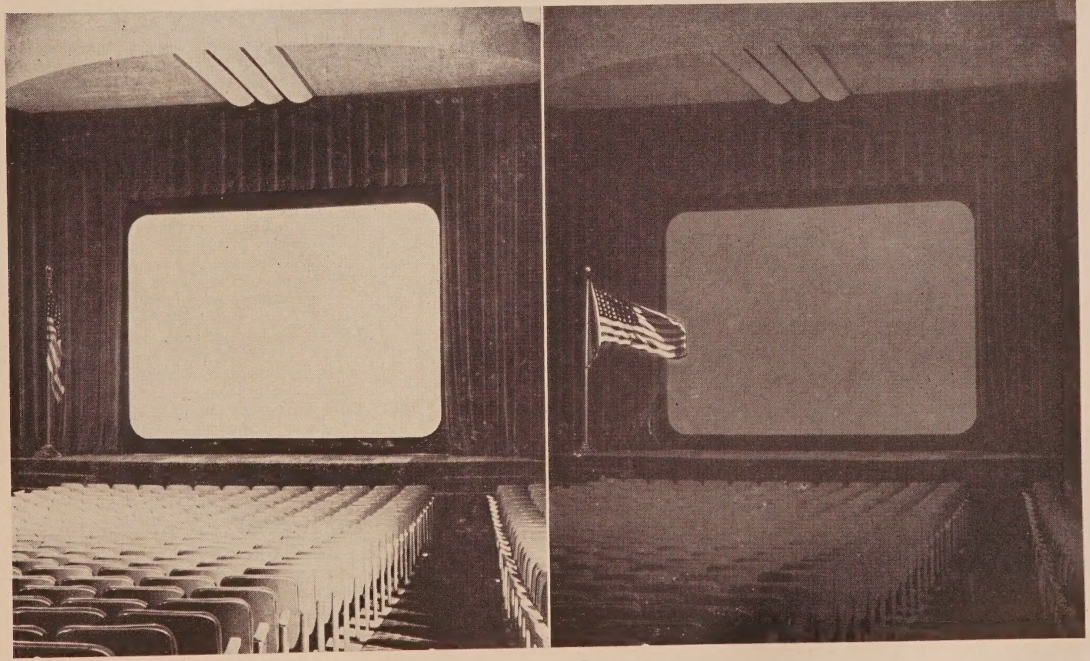
"How can I install black light?" It is easy to install. Black light is handled exactly like any other light.

Careful installation is necessary. Black light should never shine directly into the eyes. Its ultraviolet rays may produce an unpleasant haze, as the calcium in the eyeball—and the chemicals in some tinted eyeglasses—are mildly fluorescent. Therefore, the theatre manager may want to be careful to place the lights properly, and also to avoid spillage. It is shielded exactly as you protect the eyes from an ordinary bulb or light fixture.

Sources of black light can be concealed in strips along the sides of panels, or in coves below the ceiling. Urns, pedestals, or similar decorations are excellent places to conceal the units. Generally, it is wise to equalize the light. The advantage of an even distribution is that it makes the colors in the design uniformly bright. An ideal location to assure proper illumination of a side wall mural is in the ceiling. It should be placed at an angle, centering the beam two-thirds of the way from ceiling to floor.

Black-light consultants work with any theatre decorators anywhere in the United States. They explain techniques, and make suggestions. This service enables large and small operators alike to keep within their budgets while modernizing their theatres with black light and black light products.

FOR SPECTACULAR EFFECTS, black light is in a class all by itself. For example, at the left is seen an American flag mounted on stage right, viewed as the audience might see it before the show started. Then, as the house lights dim, black light floods the flag and, through a fan hidden in the wings, Old Glory blazes forth in new and more glowing brilliance! Other effects no less striking can be arranged, particularly at different seasons of the year, such as, for example, a dazzlingly brilliant Christmas tree, on the stage or as a lobby display. (All photographs are used through the courtesy of Black Light Products.)



Interior Lighting — Stepchild of Design

Inside Illumination Methods Must Follow A Definite Plan, From Marquee to Screen

By Howard Sharp

Consulting Illuminating Engineer, and Past-President of the Illuminating Engineering Society

In the planning of a motion-picture theatre, all elements which make up the whole must contribute to the basic function. Just what this basic function is may be a subject of some discussion. Some would say entertainment, others say education, still others say relaxation and escape from the environment in which the beholder finds himself. These are all correct answers, but fundamental to their achievement is the establishment of illusion. The patron steps from the street, the world of today, and, in a very brief space of time, must shake that off and enter into the mood of whatever is being offered. Now this process is almost entirely visual. It has long been established that over 80 per cent of the impressions which people receive from their environment are by way of the visual sense. This being the case, it is surprising to find so much theatre lighting which falls far short of its ability to create mood, and furthermore to find so little understanding of the basic visual problems set up by the chain of sequence from lobby to viewing the picture.

These essentially involve the process of adapting the eyes from the brightness under the marquee to the dimness of the auditorium. For daytime patrons, the conditions are most severe, and some compromise must be made. Night-time patrons, however, can be very satisfactorily accommodated. Thus, the visual problem is in two parts: one, the psychological in the creation of impressions which in turn create mood; and the other, a straightforward recognition of the physiology of the eye in the change of light adaptation.

The opportunity is now at hand to rectify old errors in existing structures, and to avoid them in the new. It is realized that every theatre presents problems which can only be solved by individual study. The purpose of this article is to present, in so far as possible, basic considerations which would be germaine to overall planning and certain specific suggestions which would serve as guides, but still require detailed planning and specification before being incorporated in the structure.

THE MARQUEE

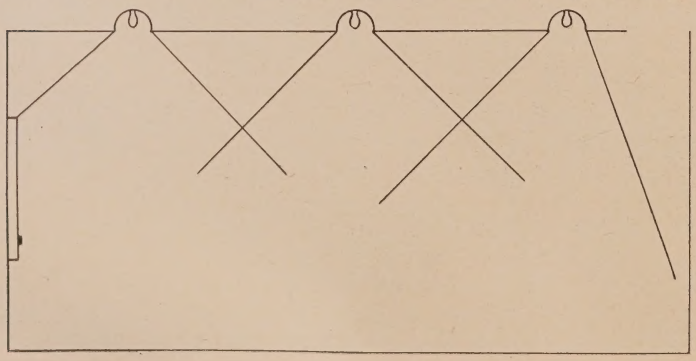
While this important part of the structure has at first thought no part in a discussion of interior lighting, it is the first link in the visual chain. The function of the marquee is to attract, and, for this, color, motion, and brightness are basic elements in which lighting plays a large part. In the daytime, this lighting treatment builds up no brightness which can compete with daylight adaptation, but, at night, the patron is under its influence long enough for the brightness to have meaning. An analysis of effective marquees shows that approximately 30-40 footcandles of light will be found under them. These footcandles result more from lighting effects, which have attraction as their basic function, than deliberate attempt to just build footcandles for seeing purposes. However, this resultant light should be taken into account in the design of the interior in order to accomplish a smooth transition during the time the patron moves from entrance to auditorium.

THE LOBBY

This serves as an emergency waiting place and patrons are not in it for any appreciable length of time. All lighting equipment should be concealed and a horizontal level of illumination of not over 10 footcandles is suggested. The decorative scheme, if in the darker tones on sidewalls and ceiling, will aid in lowering the adaptation level and enable display posters to be effective when dimly lighted.

A suggested treatment is to provide a light colored floor, and to conceal all lights in the ceiling (Figure 1). The light floor is a safety measure while allowing darker side walls and ceilings. Display panels for advertising purposes could be correlated with the ceiling downlights so as to make unnecessary any supplementary lighting. This not only effects an economy but removes sources of brightness to which the eyes adapt. Many designs have erred in that dark side walls, ceilings, and floors, and low levels of illumination have been achieved, but spots of light intrinsically not bright, but relatively so, create a pattern of confusion which makes vision difficult, and hence tends to nullify the effect desired. This has been true not only in foyers, but in many public areas of theatres and elsewhere. The point here is to urge a lobby treatment which is subdued, yet visually comfortable while meeting the needs of safety and recognition.

FIGURE 1.—A suggested treatment for lobbies is indicated here, using concentrating reflectors. At locations other than bulletins, poster frames, and the like, the light is directed away from the walls, through the use of louvers, or lenses, at the ceiling openings. Diffusing material should not be used, as this would not keep the light away from the walls, which is the important angle of this particular type of lighting installation.



FOYER

The foyer is a circulation area, yet it may also be a waiting place, so an opportunity is presented to create atmosphere or mood as well as contribute to the conditioning of the eyes for the auditorium. In many smaller theatres, the foyer opens directly into the auditorium, and this restricts the treatment. For those theatres with a large foyer, separated from the auditorium by opaque doors, the latitude is greater. In the former an amount of light about double that of the auditorium is indicated, probably not over two-tenths of a footcandle, but the light sources must be well concealed. Large luminous areas set into the ceiling, or circular coves (Figure 2) are the best choice because they are the least conspicuous. Low reflection factors —under 50 per cent for wall and ceilings and 10 per cent for floors—is necessary. As decorative touches, murals or figurines which fluoresce under ultraviolet, can be incorporated because their brightness can be controlled and they are of themselves no source of light.

In the foyer which is separated from the auditorium, more latitude is available. Again, however, the general level of illumination should be low, not over 2 footcandles. Walls and ceilings should be in dim tones, but the carpeting could be reasonably light to add to safety and interest. In addition to recessed ceiling sources, as described above, cove lighting, extended troughs, and suspended fixtures may be utilized. Fluorescing murals, statues, and niches for silhouette effects can be utilized so long as brightnesses

are subdued, probably not over 2 foot lamberts. Edge lighting of etched glass or plastic panels can be most effective. In large areas paintings are often used, but it is not easy to obtain for scrutiny sufficient lighting which does not build up a brightness to nullify the adaptive process.

AUDITORIUM

In a sense, we can appropriate a famous quotation and say that "What is past is prologue"; because, from marquee to auditorium, the passage of patrons is but preparation, both in mood and vision, for the presentation.

A fundamental is that all light sources should be concealed. In many of the smaller theatres, one finds side wall brackets decked out with colored bulbs, and, being right in the visual field, are annoying and distracting. Indirect lighting effects are the first choice, because brightness can be easily controlled. Large luminous areas in the ceiling are also effective.

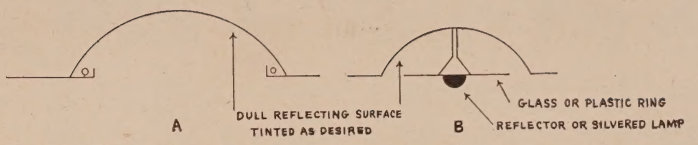


FIGURE 2.—For foyers, being a circulation area, two ideas are indicated. At the left, a large luminous area is set well into the ceiling with the dull concave reflecting surface tinted as desired. The light source is located in a trough rimming the area. At the right is shown how a glass or plastic ring used in conjunction with a reflector or silvered lamp can be utilized for delivering sufficient illumination to the foyer area.

TABLE 1.—Recommended footcandles and the brightness levels suggested for theatre marquees, lobbies, foyers, auditoriums, lounges, and rest rooms.

Location	Horizontal Footcandles	Brightness
MARQUEE	30 to 40	.....
LOBBY	5 to 10	Sidewalls 2 foot lamberts
FOYER		
Separate area	2	Spots of light 2 foot lamberts, ceiling and walls 1 foot lambert
Part of Auditorium	2/10	Spots of light 2 foot lamberts, ceiling and walls ¼ foot lambert
AUDITORIUM		
Area adjacent to screen	.....	2/10 foot lamberts
Walls	.....	2/10 foot lamberts
Points of light on ceiling	.....	3 foot lamberts
Large ceiling areas	.....	¼ foot lamberts
Aisles	.....	2/10 foot lamberts
Stage curtain before show	.....	5 foot lamberts
Ceiling and side walls before show	.....	2 to 10 foot lamberts
LOUNGE		
General area	5	.....
Reading points	20	.....
REST ROOMS		
General	10	.....
Mirrors	20	.....

Flexibility in amounts of light, as well as in color, is desirable. Ability to provide at least two levels of lighting and brightness will take care of the showing of pictures and the periods before and between shows, and for housekeeping. By providing color flexibility, the cooler colors, such as green and blue, can be used in warm season, and reds and yellows for colder periods. These colors, of course, would not be strong, but tints only. With the trend towards simple, functional auditoriums, light becomes a powerful factor in allowing for variety, change, freshness, without actually making any physical changes.

All of this should be accomplished with the basic requirements of vision kept uppermost in mind. Since the screen is the brightest area, let us start with that point and relate all other brightnesses to it. The standard for screen brightness, from the projection point of view is set at 20 foot lamberts maximum to 5 foot lamberts minimum, depending upon viewing angle. However, patrons do not look at a blank white screen. Therefore, the brightness to which the eyes adapt is considerably lower, as is the amount of light flux which is reflected into the auditorium. For black-and-white pictures, measurements indicate an average brightness of 3 to 4 foot lamberts, and for technicolor not over half of that.

The area surrounding the screen, possibly the front fifth of the auditorium should have a brightness about one-twentieth to one-twenty-fifth that of the screen, or about two-tenths foot lambert. There is reluctance to accept these ratios, because of the fear that illusion and concentration will suffer. However, surroundings in drive-in theatres are not dark, and experience with traveling outdoor shows has shown that a 10 x 13-foot screen, lighted with a 1,000-watt projector, is bright enough to hold attention even in full moonlight!

Surrounding screen brightness can be obtained in several ways. If the proscenium is large a light colored back drop illuminated softly from above and at sides can be utilized. If the auditorium walls slope right into the screen position, vertical planes with lights concealed behind are feasible. Another method would be to utilize ultraviolet or black light to fluoresce the surrounding area, the energy sources being easily installed and concealed in the ceiling.

Wall surfaces in the remainder of the auditorium should remain at about the same brightness as those near the screen because they occupy the perifery of vision and hence will distract if there is any significant departure from the brightness of pattern.

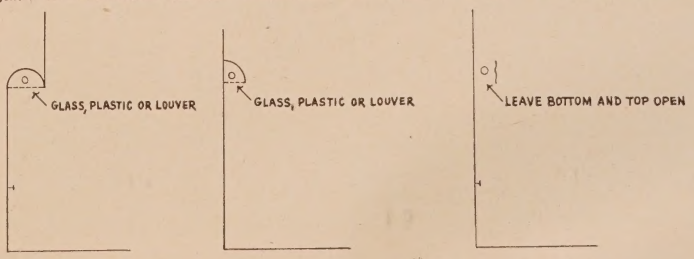
The ceiling may be of higher brightness because it is more out of the line of vision. Points of light should be under 3 foot lamberts, while any large luminous surface such as the ceiling, or portions of it, should remain below 0.25 foot lambert.

The aisle lighting can be higher than is usually found because it is most useful when patrons are coming in, before adaptation has been completed in spite of our best efforts. The aisles do not enter into the visual field once the patron is seated so a brightness of two-tenths foot lamberts is desirable. Considering the average reflection of the carpeting, this means an incident illumination of 3 footcandles. It need not be uniform, but many existing arrangements are far too spotty.

Extensive experience during wartime with vision in dim surroundings has shown that blue light should be carefully handled. The retina of the eye outside of the central portion is extremely sensitive to blue, so its use on side walls or ceiling should be discouraged. It has also been found that colors on the reddish side aid in maintaining a state of low brightness adaptation. Thus, decorative schemes generally should lean that way.

The lighting of the auditorium at times before showing, while people are filing in can be of a higher order, but restrained. An illuminated draw curtain, itself in warm tones, is desirable. The brightness should be around 5 foot lamberts. General horizontal footcandles need not exceed one, and lighted portions of ceilings or side walls may be in the range of 2 to 10 foot lamberts. Lighted murals, niches, statuary, etc., can be incorporated, but they should be unlighted while the show is on. Fluorescing pigments and plastics, edge lighting, and the like offer many possibilities for decorative touches.

FIGURE 3.—Attention can be called to lounge and rest rooms by means of the lighting treatments indicated in this drawing. Those shown at the left and center are variations of the same idea, and provide for a shield of glass or plastic or of a louver to diffuse the light, while that at the right has the advantage of supplying some general room illumination. This idea could be repeated over entrance and exit doors, blending with decoration.



.ABLE 2.—Effect of daylight, white, soft white, and filament light sources on various materials and pigments. (Source: Cleaver, Oscar. Effect of fluorescent lighting on certain pigments. Illuminating Engineering 35 (9). 1940.)

Item	Daylight	White	Soft White	Filament
Untanned skin, no makeup	fair	acceptable	preferred	good
Tanned skin	fair	fair	preferred	fair
Untanned skin, with makeup	poor	fair	preferred	good
Blond wood	good	fair	preferred	good
Mahogany	good	good	good	good
Maple	fair	fair	good	good
Greyish finish	good	good	good	good
Deep blue wall color	vivid	rich	vivid	greyed
Blue green wall color	blue green	grey green	greyed	yellowed blue
Yellow green wall color	fresh blue green	yellowed grey	slightly grey	yellowed pale green
Peach wall color	slightly pink	normal	normal	normal
Pastel tan wall color	greyish	yellowish	cream	strongly yellowed
Cream wall color	faded grey	slightly greenish	cream	cream
Red wall color	slightly bluish	yellowish	warm	yellowish
Rose wall color	bluish	yellowish	vivid	yellowish
Deep yellow wall color	greyish	vivid	slightly grey	reddish

LOUNGE

This is purely a customer service area, but presents an opportunity to make friends for the theatre operator, and contributes to the general impression of comfort and mental satisfaction.

In general, simplicity of lighting treatment is desired. Floor lamps, pictures, mirrors, and so forth, are familiar items and acceptable. Elaborate lighting plans are not necessary. Simple ceiling fixtures, or circular coffers are always practical. The room should not be dim, but general lighting of 5 footcandles and 15 to 20 footcandles at lounging points simulate a well lighted living room.

Attention to the rest rooms can be directed by means of lighting treatment shown in Figure 3. That in Figure 3 (c) has the advantage of supplying some general room illumination and could well be repeated over entrance and exit doors.

REST ROOMS

Illumination of not less than 10 footcandles should be provided. This aids in housekeeping and contributes much to the patron's feeling of ease. Inasmuch as vandalism in such areas is common experience, the lighting equipment should be sturdy and out of the way as much as possible. Close fitting ceiling globes, or flush panels as in Figure 4 (left and center) are good. If the structure can be so arranged a system shown in Figure 4 (right) is excellent. The cove lights the general area, while diffusing plates allow light from the same source to flood the toilet compartments. They can be placed high enough to be out of hand reach.

For the mirrors, probably the safest design is that of fluorescent tubes encased in stout plastic or glass half cylinders placed above the mirror. When several mirrors are adjacent, it will be economy of wiring to install the lighting in a continuous strip.

LIGHT SOURCE CHARACTERISTICS

Filament Lamps

Filament lamps provide light which is flattering to human skin and for which most pigments and fabrics have been matched. They can be flashed and dimmed smoothly, from full brilliance to black out. Bulbs are available with built in reflectors for spot lighting and for indirect lighting. Because the glowing filament is relatively small, good control and projection of the light is possible. They are available in commercial sizes from 6 to 1,500 watts, operating directly from 120 volt circuits.

Fluorescent Lamps

Fluorescent lamps provide light which is rich in color, as well as three working tints—daylight, white, and soft white. It is anticipated that others will be available in the future. At the lower levels of lighting used in a theatre, the daylight lamp is not flattering to human skin. The white and warm white lamps should, where used in an area with a planned decoration scheme, have the decoration colors matched with the source.

All fluorescent lamps require a ballast which consumes wattage in addition to that marked on the lamp, and certain ones require a starter as well. They cannot be flashed or dimmed. However, they possess inherently longer life than filament lamps and, for locations where long burning hours are the rule, such as 6 to 12 hours burning for each start, their life may reach 6,000 hours.

Fluorescent lamps with starters are known as hot cathode. They require several seconds to light up. They come in sizes from 4 to 100 watts, from 6 to 60 inches in length and in diameters from ⅝ inch to 2⅛ inches. The 40-watt lamp may be secured for instant starting, in which case the starter is eliminated.

Thin fluorescent lamps in ¾-inch and 1-inch diameters are now available in 42-, 64-, 72-, and 96-inch lengths. Depending upon the ballast used, the wattages range from 15 to 52. These lamps operate without starters.

Now coming on the market are circular fluorescent lamps in 8½-inch diameter, 20 watts; 12½-inch diameter, 30 watts, and 16-inch diameter, 40 watts. These are complete circles and offer many decorative possibilities for theatres.

Neon Lamps

The small diameter, custom-made, series-operated fluorescent tube is generally referred to as "neon." It has long life, and can be shaped in almost any desired form. Although the efficiency is lower, this is not a ruling consideration in areas where effect is paramount. However, because the tubing is custom-made to fit a particular installation, the source of supply should be investigated in order to insure replacements when required. An "orphan" lighting system is an expensive and irritating operating problem. This high voltage tubing can be dimmed down to about 15 per cent of full brightness.

MAINTENANCE

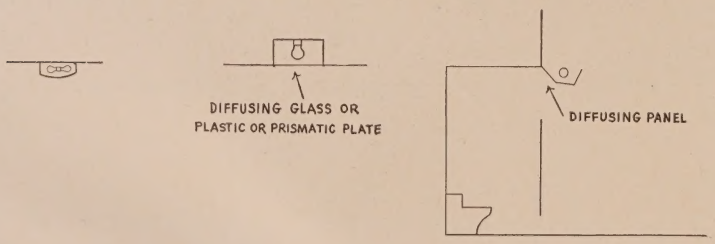
Any lighting treatment should be analyzed from the viewpoint of bulb replacement, fixture cleaning, and repairs. When the lights are first turned on everything is new and fresh, but bulbs age, blacken, and burn out, repairs need to be made, and periodic cleaning is a necessity. If these chores can be done with reasonable facility, they will not be neglected; but if manpower, equipment, and time are needed in major quantities, then the lighting will almost always be in a chronic run-down condition.

Foresight requires (1) a lighting installation that can be "got at" by ordinary labor, not steeple jacks, (2) equipment that is well made and whose electrical components are of high quality, and (3) choice of light sources which puts long life as a major consideration in locations that are inherently difficult to reach.

The first requirement is basically one of design and lies chiefly in the hands of the architect. The second and third are in the province of the engineer and the owner, because, if the budget is skimped, there are limits to what even the best talent can do. Of course, all three require the cooperation of the owner, architect, and engineer if the best results are to be obtained.

A factor of importance in the life of fluorescent lamps is to have the supply voltage at the design level. If voltage is low on filament lamps, they give less light but live longer. With fluorescent lamps low voltage acts principally to shorten life and to make starting difficult. A point to remember with filament lamps is that if they are used in locations difficult to reach, a lamp rated at, let us say, 120 volts, can be used on a circuit where the voltage runs at 110, prolonging the life about 25 per cent and cutting down the light by about the same amount. The color of the light will be on the reddish side but this will probably be an advantage in most decorative schemes.

FIGURE 4.—In the rest rooms, close-fitting ceiling globes, as shown at the left and center are good. If the structure can be so arranged, a system shown at the right is excellent. The cove lights the general area, while diffusing plates allow light from the same source to flood the toilet compartments. They can be placed high enough to be out of reach from any who might be tempted to perpetrate any vandalism, intentional or otherwise.



Theatre Carpets, 1946: An Industry Report

Committees of Manufacturers' Institute Tell What Is in Store in New Carpeting

By the TECHNICAL COMMITTEE
Institute of Carpet Manufacturers of America, Inc.

Although during recent years nearly 80 per cent of the carpet industry has been devoted to the war effort, its technicians and stylists have been continually studying theatre problems in relation to carpet fabric. Now that the industry is once more able to produce carpets, it will have the benefit of the latest research and will reflect the latest modern trends. Production is already under way.

This article will attempt to give some idea of what may be expected in the new products.

Roughly, the problems of carpet fabric for theatres fall under the following headings: Color and design, acoustical properties, safety, and durability. The research departments of the various companies have given a great deal of attention to improvement along all of these lines.

COLOR AND DESIGN

Considering color and design, a large range of carpet fabric in both traditional and modern styles may be expected. While most floor-covering stylists agree that there is a trend to the modern, this does not mean that the traditional styles will be neglected nor does it mean that the new modern will be like that of ten years ago. Instead of being achieved by sharp lines and angles, the new modern will be the result of texture effect which is created through weave and the use of shaded color tones.

Design will also play its part in emphasizing texture effect. The new modern carpet will be something less spectacular than the old modern, and much softer and more homelike in feeling.

In general, the range of colors available will be greater than ever before. Carpet stylists have considered color in relation to theatre lighting. Color and design will be planned with the idea of greater visibility.

In the selection of both the color and design in carpets, the theatre executive must remember that the theatre is a unit. Color is dependent on the number of foot candles of lighting. Design is dependent on the feeling and design of the theatre itself. All must blend together to form a complete whole.

Fluorescent Effects

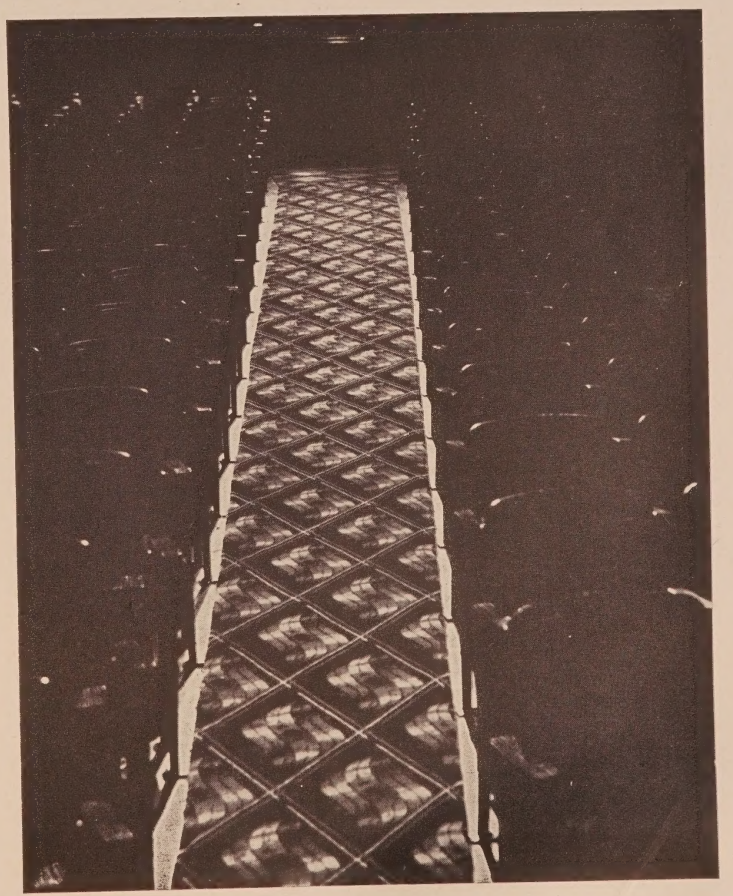
The newest and most startling feature to come out of the carpet industry, involving color, design, and light, working as a unit to give an amazing effect, is carpets which fluoresce under black light. These fluorescent carpets are not only a source of beauty and color in a darkened house, but they also have great possibilities as a safety device and as traffic directives.

Carpets are made fluorescent through the use of dyes having pigments with the power to glow under ultraviolet radiation, often called black light. Although they are not sunfast, fluorescent carpets may be treated and cleaned exactly like ordinary carpets. Their color and design appear quite different under daylight and black light—the intensity of the fluorescence being largely dependent on the colors used and the power of the black light itself.

Lamps of two types may be used for black lighting theatre aisles. The first is a 250-watt, filament-type, black light, which will give good results when installed in the ceiling, providing the height of the ceiling is between 8 and 15 feet.

For the greater heights, this installation is not recommended. Instead, it is better to use the 4-watt, fluorescent-type black light, which may be installed in the aisle seat at every row or every other row. While this second type does not require a transformer, and is, therefore, cheaper per unit price, the total installation is more expensive because of the larger number of lamps needed. A 4-watt lamp gives only localized light

FLUORESCENT CARPETS is another development which is headed for greater use in the future. Involving color, design, and light—all working together as a unit—these carpets, fluorescing under the influence of black light, have possibilities as safety devices and traffic directives. Seen in this photograph is an aisle installation in the Legion Theatre, Mayfield, Kentucky. This one was manufactured by Alexander Smith & Sons Carpet Company.



which falls off very rapidly, so that, to give adequate lighting, lamps must be closely spaced. One electrical company quotes $20 a unit for the 250-watt lamp, complete with transformer, while the price of the 4-watt lamp is $10. Neither of these figures includes wiring costs.

ACOUSTIC USES

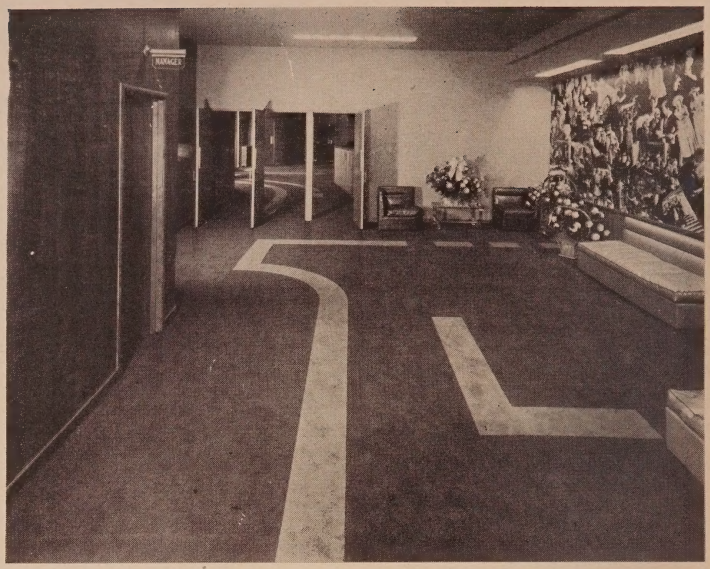
As far as acoustics are concerned, of course, all carpet fabric has the property of deadening foot travel and of improving the acoustics of the whole auditorium. Frequently, the use of carpets in the aisles and the standee area will solve sound problems which often plague theatre executives. Although the bulk of the industry research has been devoted to color, design, safety and durability, whenever it is possible to improve the acoustical properties of carpet fabric, such improvements will be made.

SAFETY

Safety of carpeting is directly dependent on lighting and methods of installation. Considerable research has been done on the installation of stairway carpeting. One of the chief problems has been the play between the carpet fabric and the felt underlay, caused by the rapid wearing down of the underlay itself. Such play makes tripping easy. To reduce play, the use of sponge rubber as an underlay on the tread and the nose of the stairs has been recommended. More will be said on this subject in the section on durability.

DURABILITY

Carpet-wearing qualities are just as important to the theatre executive as style appeal. No longer are weaves a measure of quality. Instead, density of pile is the barometer of durability. Tests show that carpet fabric having twice the compactness or density of wool to the cubic inch of pile will wear four times as long.

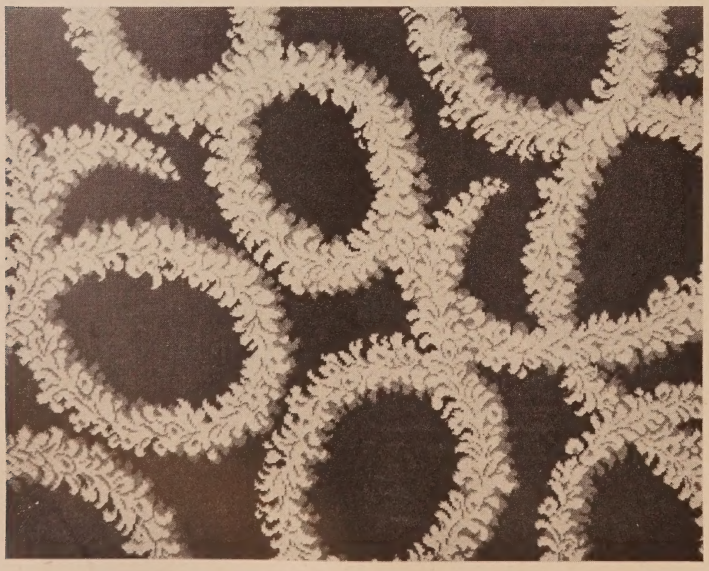


BROADLOOM CARPETS of solid colors, but cut and fabricated to special designs, have a field of usefulness in the theatre, as is shown in this photograph of the foyer of the Webster Theatre, Hartford, Connecticut, for which the Bigelow-Sanford Carpet Company, Inc., provided the material for a Bigelow Lokweave broadloom installation. Where the walls are without too much embellishment broadloom carpeting should be considered.

Naturally, carpet wearability also increases in relation to the height of the pile. Plastic or synthetic backing of carpets increases their resilience. Up to a certain point, increased resilience means increased wear.

Round wire or looped pile carpets will probably be a style trend largely because they offer durability, having greater abrasive wear resistance. In general, the appearance of roughness and ruggedness in carpet fabric is an indication of long-wearing possibilities. Hard-type pile is durable, but the soft type, while more luxurious, is less durable. Tests have shown that stair carpets laid over sponge rubber on the tread and the nose, wear longer than the same fabric with a felt underlay.

A STYLIZED CONVENTIONAL PATTERN, this type blends the decor of the past with the mode of the present, together with the addition of clear color. Thus can much be added to the decoration of areas where light and gaiety are needed. This particular carpet pattern was designed by Howard Eberwein, director of design and color for the Lees-Cochrane Company, Inc. Future developments will make such patterns more generally useful.



THE EXPERTS COMMENT

The factors outlined above are the most important considerations in the selection of theatre carpeting. Briefly, we have tried to highlight a few of the current trends.

Perhaps these brief statements from some of the people outstanding in the field will serve to emphasize what we have been trying to say.

William Brown, stylist for Alexander Smith and Sons and C. H. Masland and Sons, describes the current trend in theatres and multiple enterprise projects as modern architecture and simple decoration.

The amusement projects known as multiple enterprise, now in operation and being planned are spacious modern buildings which convince us that this undoubtedly is the direction in which the amusement industries are going. We are preparing merchandise specifically designed to suit the requirements of the new theatre and multiple enterprise projects and are also giving consideration to requirements of the renovated traditional theatres.

IN THE MEZZANINE FOYER of the Saint James Theatre, Asbury Park, New Jersey, is an example of the Ridgefield high-pile Wilton carpeting, manufactured by A. and M. Karagheusian, Inc. Here the design of the carpet removes the bareness which might obtain had a solid color been used with the plain ceiling and a wall is relieved only by a few recessed circular plaques. Here the balance of color and design makes attractiveness.

Brown adds that new fabrics, in addition to the Smith Crestwood wool velvet line and the Masland Wilton line, are being developed and that many of these will be round wire constructed to resist hard wear.

Howard J. Eberwein, director of design and color, Lees-Cochrane Company, Inc., says:

Color and design will be used to the limit of their previously unrealized capabilities. Taking individual parts of each amusement floor area, we find that the furniture, walls, woodwork, ceiling, draperies, and carpets are a composite of each element, so closely related that they achieve a harmonious effect in design, form a color only through proper application and correlation of all areas concerned. Gone forever is the meaningless application of design.

W. H. McGimsey, stylist for A. and M. Karagheusian, Inc., states that the growth of the multiple enterprise project is one of the most important influences, adding:

The type of carpet that will be sought will be more nearly like the ones favored in the home. The old type—spectacular with large patterns and strongly contrasting colors—will begin to look dated. Quiet and more intimate effects will be wanted. Chamber music rather than the brass band, as it were.

T. E. Brown, merchandise manager, Mohawk Carpet Mills, Inc., believes that the modern in floor coverings starts with the fabric. He says:

The modern floor covering of the future will be based on texture. If the fabric has texture, and this will be the ideal, the design and color will be used to enhance the texture. If the fabric itself is not textured, then the design and colorings must be so handled that a texture appearance is attained.

The Styling Department of the Bigelow-Sanford Carpet Company reports:

The considerable advances which have been made in the styling of rugs and carpets are certain to be reflected in floor coverings for theatre use. Colors and designs especially adapted to specific spaces in the theatre may be expected. The use of directional lines in patent-back carpeting, employing the "inlay" principle, are also due for wider use. More and more, the style weave and texture of the floor coverings selected will be co-ordinated with other decorative elements in the theatre—the wall colors, upholstery and drapery fabrics and furnishings—just as they are in today's well-groomed home.

Robert J. Carson, president of Thomas L. Leedom Company, states:

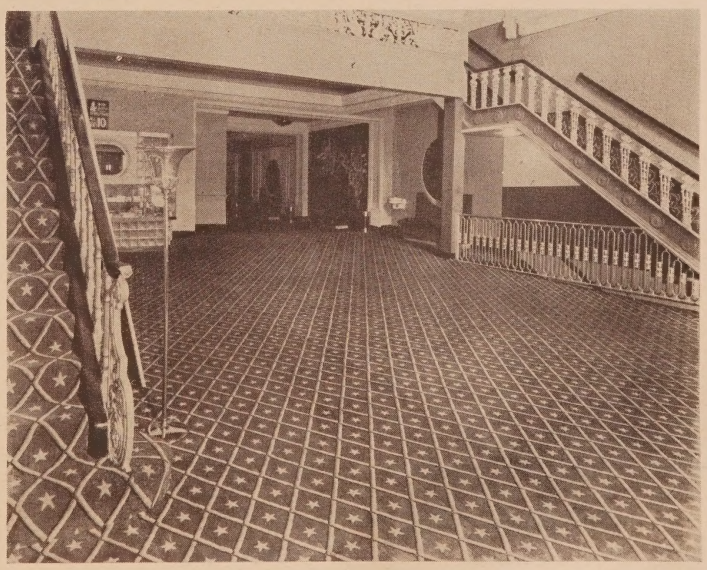
Modern trends in architecture and furnishings will be popular in a very modified form. Modern, conventional, floral and period styles in various weaves will be available for every type of decoration. Round wire (looped pile) has been having quite a test in some very trying installations and is standing up very satisfactorily. Any type design can be used in this fabric. Some of the more recent types of Wiltons, such as carved effects, use of various pile heights, and fleeze yarn for figure effects, may be used for powder rooms, lounges and other special rooms.

Alfred Oakley, stylist for Hardwick and Magee Company, says:

The theatre has long acknowledged the need for attractive show places, but the trend now is definitely toward simplicity. The interiors will be less ornate so as not to detract from the performances and the soft indirect lighting enhanced with blended multi-color effects, will add much to the modern theatre. The carpet too, must be in keeping with the rest of the furnishings. Color, as always, will be a large factor. This should be considered first, then a simple design attractively executed. There are many new types of carpets which will be available—round wire, high and low wire effects, cut and uncut pile, sculptured and embossed carpets.

In conclusion, we should like to emphasize that style appeal, simplicity of design often achieved by texture effect, increased color range, and great durability will be found in the industry's new lines. There will be carpets to suit every type of auditorium. They will combine beauty and practical improvements to a degree not reached before the war. They will be an asset to every theatre.

THE LOBBY of the Palace Theatre, Chicago, has a floor covering of ¾ Scotia, Pattern 30812, manufactured by the Mohawk Carpet Mills, Inc. Here the scale of the area to be carpeted has been taken into consideration, with a design selected which can serve several useful purposes than just a floor covering. Depending on how one looks at the design, one may be "directed" to the stairs, candy bar, or auditorium, all patron services.



Guide to Maintenance of Theatre Carpets

A Brief Summation of What Should Be Done To Get the Most from Your Floor Covering

By Technical Committee

Institute of Carpet Manufacturers of America, Inc.

The general problem of carpet maintenance in theatres really falls into four separate divisions—daily cleaning, periodic check-up of installation factors, periodic surface cleaning, and periodic thorough location cleaning. This article will take up each part of the problem in order and will attempt to give some of the pros and cons about location cleaning methods with the initial reservation that carpet manufacturers cannot take responsibility for the results of any location cleaning technique so far available.

DAILY CLEANING

The chief object of the daily cleaning of theatre carpets is the removal of gritty material which has been ground into the pile by foot traffic. (Figure 1.) This dirt is often embedded in the base of the pile tufts or even between the yarns of the back. It has sharp, knife-edged particles, which can cut the pile tufts if it is continually ground in by foot traffic. The daily removal of such heavy dirt is very important to the durability of any carpet, especially those installed in public places. Thorough vacuuming with a machine of the beater-brush type is recommended daily for all well-traveled areas. Certain tests have shown the superiority of the beater-rotating element vacuum cleaner over straight suction vacuum-cleaner methods, but whatever vacuum-cleaning equipment is used, great care should be taken to maintain it at peak efficiency. The efficiency of the vacuuming equipment largely determines the thoroughness of the dirt removal.

Spilled materials should be removed as soon as possible. Therefore, this is also a part of daily cleaning. The general rule is to remove oily or greasy materials with solvents, and other materials with water. Water should be used with such things as beverages, food, or other water-soluble materials, and the pile should be blotted dry after cleaning. Daily cleaning of spots by these methods will keep to a minimum color changes in carpets resulting from spillage.

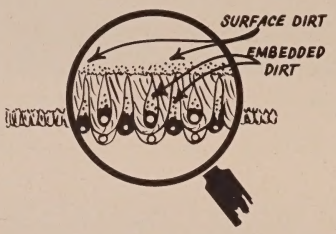


FIGURE 1.—Diagram showing how dirt becomes affixed to carpets: imbedded between the pile loops and between the ends of the loops themselves, as well as on the surface of the pile. Good cleaning practice, of course, removes dirt from all these places.

CHECK-UPS OF INSTALLATION

To proceed to the second phase of our problem, the periodic check-up of certain installation factors, the following checks are recommended by carpet manufacturers as being important in prolonging the life of the carpet:

(1) The shifting of worn areas. As soon as wear is apparent, the carpet should be shifted from the well-traveled areas to the less-frequented areas. Stair carpeting should be moved several inches so that worn carpet on the treads is replaced by the comparatively fresh carpet from the risers. (Figures 2 and 3.)

2. Maintaining of tight carpets. This is especially important on stairs where slackness or buckles may appear. These may be caused by crushed underlays which should be replaced to preserve the cushioning effect. (Figure 4.) Stair noses need to be carefully checked for crushed underlays. Carpet on stair risers, especially when the treads are short, also needs to be carefully checked for protrusion beyond the nose as this usually accentuates damage from heels to carpet on the risers.

Experience has shown that the wear life of a stair carpet may be increased by laying it over a sponge rubber underlay glued to the nose of the step and then a felt pad glued to the tread inside the nose.

(3) Flattening of irregular ridges. Irregular places in the floor must be checked to be sure that the underlay is preserving the evenness of the carpet. (Figure 5.) Some ridges and seams where wear is apparent may have to be covered over.

(4) Repairing of worn places. Badly worn places, tears or holes must be repaired by sewing in new carpeting. Otherwise they can be covered up with pieces of extra carpeting.

PERIODIC CLEANING

Surface Cleaning

For periodic surface cleaning the recommended cleaner is made of solvent and a dry cleaner's soap. A ½ to 1 per cent solution of the soap in solvent makes an excellent cleaner for removing spots or

FIGURE 2.—On stairs, an extra length of carpet should be provided at the top of the flight, so that some extra carpet is available for future relaying. This is important in the economy of carpet upkeep.

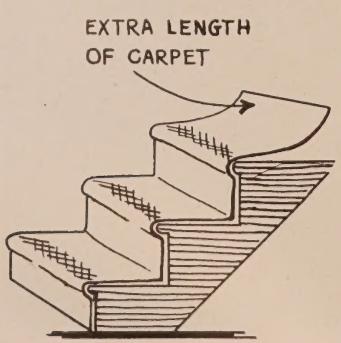
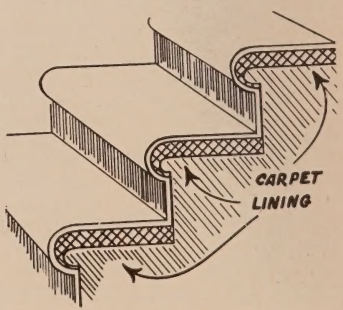


FIGURE 3.—When it is time to relay the stair carpeting, and an extra length has been left, shift the carpet down, so that the worn spots move onto the risers, leaving only fresh carpet for the treads.

FIGURE 4.—Diagram showing the proper installation of carpet lining on stairs. It is important on stairs that the carpet be tight and that the underlays be properly maintained to preserve their usefulness.



soil. It may be used with a basin and applied to the pile with a scrubbing brush for a good surface cleaning job.

Solvents absorbed in powders are also recommended for surface cleanings. These materials are rubbed into the pile with a brush, then allowed to dry out and finally vacuumed out. A rather good job can be done with these cleaners at low cost especially if the carpet is not too soiled.

Location Cleaning

As has been stated in the beginning of this article, carpet manufacturers cannot accept responsibility for the damage which may result from location cleaning. There is wide variation in method and materials, not to mention between the operators of the same equipment. Perhaps the points which the manufacturer considers to be the faults of most location cleaning techniques should be listed. They are the following:

(1) Wetting of the back and slow drying. Because with most location cleaning techniques it is impossible to avoid wetting through to the back of the carpet in some spots, rotting away of backing yarns has often been attributed to floor cleaning technique.

(2) Slow drying of the surface. Sometimes it takes several days for the pile to dry. This may cause rapid resoiling and even crushing of the pile which gives the carpet a shaded or faded appearance.

(3) Incomplete cleaning of the pile yarn. Even though detergents are used in water, the surface does not always return to its original color.

(4) Rapid resoiling due to the types of soaps and detergents used. If real soaps are used, the resoiling is rapid. If the soapless types are used, the cleaning ability is less and a fuzzing of the pile surface often occurs.

In doing location cleaning, engage the services of a reliable cleaner. Be sure that the detergents used contain no alkali. Instead, they should be of the fatty alcohol type. The cleaning machine should have a suction device which will remove the washing liquor quickly before it can soak the back. Location cleaning should be done before the carpet is too dirty, then mild washing solutions can do a good job.

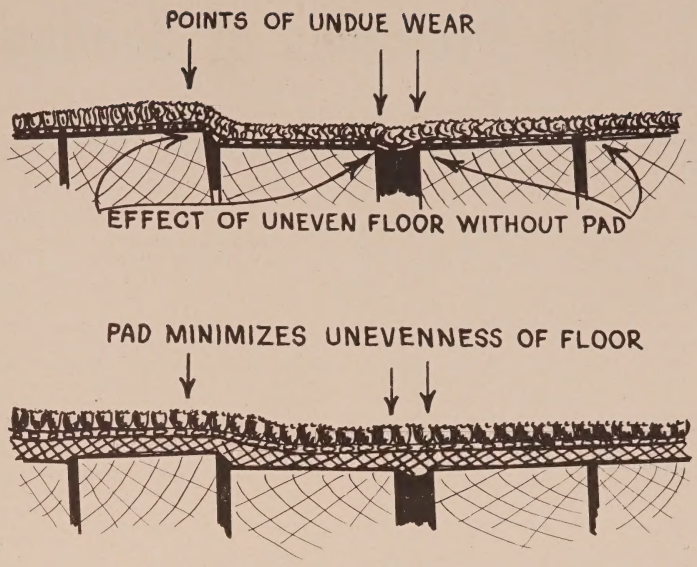
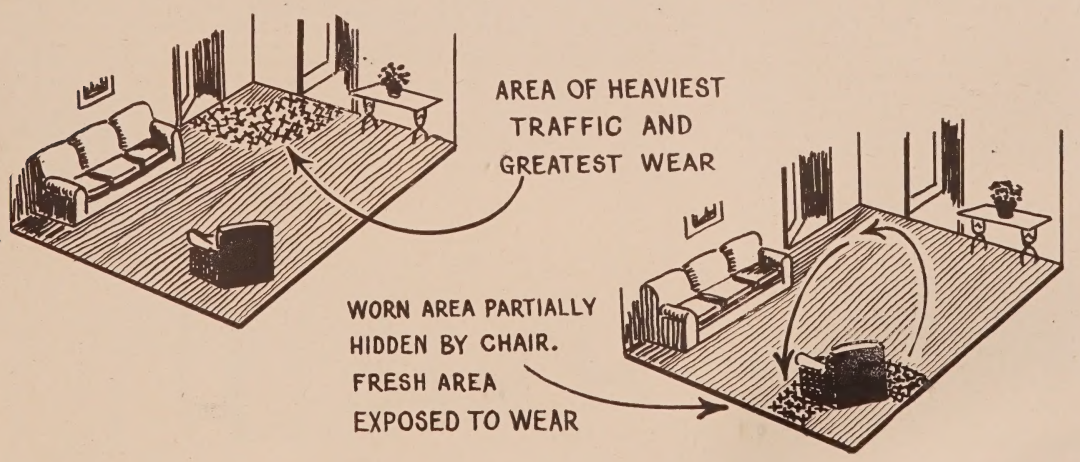


FIGURE 5—The reason for using a good grade and type of padding under theatre carpets is well set forth in these drawings. Without padding, uneven floors result in points of undue carpet wear (upper figure), but where a good pad is used, the effect of these points of unevenness is minimized through the resiliency of the pad (lower figure). Practically all floors are imperfect in spots and pads should be used as a matter of course.

CONCLUSION

In conclusion, the carpet manufacturers wish it to be emphasized that the wear life of any theatre carpet can be prolonged by following the recommended technique for regular careful cleaning and by using proper installation methods and checking them periodically. In general, proper maintenance of theatre carpets will go a long way toward increasing the durability of even the best carpet fabric. It will pay dividends which make the extra trouble and cost more than worth while!

FIGURE 6.—In those areas of the theatre—such as ladies' lounges and men's smoking rooms—where some parts of a carpet are subject to a great deal of traffic, while other portions of the same carpet receive little or none, it is sometimes possible to turn the carpets around as shown in these diagrams. With a virtually square room, the carpet life may thus be extended three times, while in a more oblong space, the life of the carpet can be doubled. (All drawings appearing with this article have been provided by and are used through the courtesy and kind permission of the Institute of Carpet Manufacturers of America, Inc.)



The Principles of Seating Installations

The How and Why of Seating Arrangements That Make All Seats "Best in the House"

By IRVING C. FOLGER

Staff Assistant to General Sales Manager
American Seating Company

The motion-picture theatre is designed for the primary function of viewing a projected picture under the most favorable conditions. The various equipment items and materials that go into the building—the projectors and sound equipment, seating, air-conditioning, heating plant, acoustical treatment, carpeting and so forth—are integrally related in their contribution to this fundamental purpose. Essentially, it all revolves around Mr. John Q. Patron, who buys an admission ticket and walks down the aisle to find his seat. From that seat, no matter what its location in the auditorium, conditions for viewing the picture and hearing the sound must be as ideal as possible with respect to comfort, convenience and safety.

As the theatre chair is the one piece of equipment which provides the most intimate contact with the patron, the problems of seating and the effective use of space and position are among the most important considerations in planning a theatre building. The theatre owner, his architect, the chair manufacturer, and the contractor should cooperate closely in planning and construction so that the seating when finally installed will offer the very best conditions.

There is much more to this than simply ordering a certain number of chairs and bolting them to the auditorium floor. Having determined the size and shape of the auditorium, the architect, in preparing the floor plans, gives careful consideration to the incline or slope of the floor. The chair radius lines are figured accurately in relation to the width and length of the seating area, as well as to the width and height of the screen, in order to obtain the most favorable viewing conditions. Exits, aisles, and crossovers are located and the row-to-row spacing of chairs determined according to the requirements of the local building code where one exists. Provision must also be made for the exact location of floor ventilators, aisle-light outlets and hearing-aid conduits. Regardless of the particular seating arrangements used, these fundamental factors and others, too, will be given careful consideration before the architect's plan is completed.

SIGHT LINES

One of the most important problems is that of establishing the proper floor slope to provide satisfactory sight lines. The architect will give this careful thought before going ahead with overall plans for the building because the amount of excavation necessary, height and depth of the stage platform, size and position of the screen, location of the projection booth port holes, overhang of the balcony (if there is a balcony), and other important construction details are all related to the seat unit and its position on the auditorium floor.

The location of the last row of chairs just ahead of the foyer is one of the key points used in arriving at the proper floor incline. In laying out this row, ample clearance from the foyer wall or standee rail should be allowed for the flare in the chair back. Other basic factors are the location of the stage and position of the screen. The architect has determined the approximate width and depth of the stage which will be kept at a minimum if the theatre is to be used exclusively for the showing of motion pictures. Generally speaking, the total amount of floor drop below the foyer level at the front of the auditorium averages approximately ¾ inch to the foot for the distance from the back row of chairs to the front of the stage. The stage should be low enough to avoid areas on the screen which are blocked out from the eyes of anyone seated in the front row of chairs. Likewise, the screen should be high enough to clear the head of a person standing in front of the stage, thus avoiding any possible interference with the projected picture.

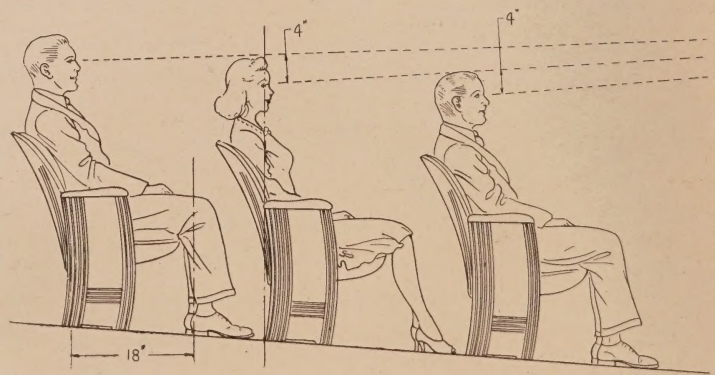
The size and shape of the auditorium and the proscenium arch will determine the screen dimensions, governed, of course, by the length of the projector-lens focus and the distance from the lens to the screen. Roughly speaking, the width of the screen should be from one-sixth to one-fifth the distance from the back row of chairs to the screen position. The screen height, of course, will be in proportion to the width, depending somewhat on the angle of projection.

The next step is to establish a common focal point on the screen from which the sight lines for all chair rows throughout the auditorium will be related to determine the proper floor incline. Location of this key focal point on the screen is sometimes subject to debate. Some architects prefer to use the lower edge of the screen, while others use a point one-third or one-fourth the screen height from the lower edge. These positions are based on the theoretical sight line clearances adopted for obtaining the same amount of vision throughout the auditorium. In general, let us say that the focal point should always be located at least low enough on the screen to include those areas where most of the photographed action takes place in the projected picture.

Using this focal point and starting from the incline break (which should be located 3 inches in back of the chair-size line for the rear row of chairs) the floor slope can be calculated for each series of chair rows. The chair-size line is the floor layout line on which the chair widths are measured and is usually located at the front or back of the rear foot on the middle standard of the chair.

Sight-line clearances are based on the assumption that the average height of a person in a sitting position is 3 feet 8 inches from the floor and that the average height of an individual's eye to the top of his head varies from 4 to 5⅛ inches (see illustration). Consequently, when the sight line for one row clears the vision point of the row directly ahead by 4 inches or more to a common fixed focal point and when this same relation-

SIGHT LINE CLEARANCES are highly important in a seating installation. One of the most important problems in providing satisfactory sight lines is that of establishing the proper floor slope. Sight-line clearances are based on the assumption that the average height of a person sitting is 3 feet 8 inches from the floor and that the average height of an individual's eye to the top of his head varies from 4 to 5⅛ inches. (All diagrams in this article have been especially prepared for use here by Irving C. Folger and the American Seating Company.)



ship exists with respect to subsequent rows, the floor incline is considered satisfactory and practical.

As seats are normally arranged in concentric rows, rarely does one seat fall directly behind another except on the center axis of the auditorium. Assuming that the spectator looks between the heads of those in the second row, he has a sight line clearance of 8 inches.

Starting from the back row of chairs and allowing 4 inches clearance for each successive row down to the front row of chairs, the minimum amount of floor slope can be established which will provide satisfactory vision throughout the auditorium. It is considered good practice to have the incline breaks or changes in the floor slope occur every three rows of chairs. More than four rows on the same incline plane are not recommended. This will generally assure a satisfactory chair installation with an overall pleasing appearance in the alignment of chair backs.

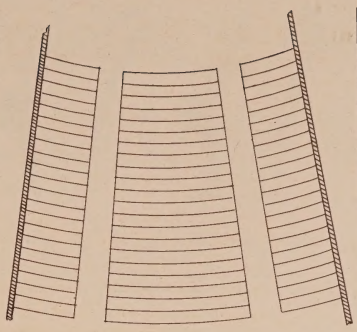
In a motion picture theatre, the distance from the foremost row of chairs to the screen should not be less than 15 feet. Also, the angle of vision from the front row to the top of the screen should not exceed 45 degrees and 40 degrees is recommended in order to avoid the possibility of neck muscle fatigue and eye strain for persons seated in the front rows.

The average theatre with a conventional floor arrangement has an elliptical or parabolic slope from the foyer to the stage, the incline being steeper at the rear of the auditorium where the problem of sight line clearances is most critical. If the gradient of the floor exceeds 2 inches incline per foot, the need for stepped platforms is introduced and this condition can be avoided on main floor seating through proper designing of the floor slope.

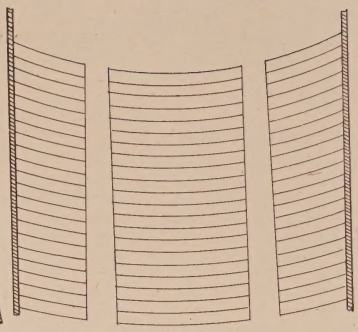
There is one other fact which the architect will have in mind when designing the floor. Chair standards are made with legs to fit all floor slopes in ¼-inch increments from level to 2 inches to the foot for conventional inclines and level to 2 inches to the foot for reversed inclines. The change from one incline plane to the next should be governed accordingly.

REVERSE INCLINES

Sometimes a reverse slope is employed to provide satisfactory sight line clearances for the first few rows of chairs in front nearest the stage. Use of the reverse incline at the front of the auditorium tends to flatten out the overall curved slope of the floor and helps to avoid costly excavation and high foundations. Also, it sometimes helps to solve the safety problem of keeping the exit door sills near the stage end as close as possible to the outside ground level. A reverse incline should not exceed ½ inch to the foot.



THE FAN-SHAPED LAYOUT has the aisles parallel to the walls, making the side-seat sections of equal width throughout the length of the auditorium, while the center section becomes somewhat triangular.



THE STRAIGHT LAYOUT is perhaps, the oldest plan, being the one most logically adopted in the earlier days when theatres were re-modeled out of straight-sided stores. For pictures, the center block was a must.

IF THERE IS A BALCONY

If there is a balcony the architect has other points to consider. Generally, the amount of balcony overhang should not exceed one-third the depth of the auditorium. For acoustical purposes as well as from a practical standpoint, the balcony should be high enough so that a person standing on the main floor in back of the last row in front of the foyer wall or standee rail will have an unobstructed view of the entire screen. This factor generally fixes the height of the first platform in the balcony. From this level the height of the risers and spacing of platforms is determined according to the local building code with the object of providing comfortable seating conditions and ideal sight line clearances. The number of rows in the balcony and the ceiling height will depend on the seating capacity desired, governed, of course, by the building limitations.

Riser heights in the balcony should be the same between cross aisles to avoid the stumbling hazard resulting from different step heights. Riser heights at the rear of cross aisles should be sufficiently high to provide satisfactory sight line clearances with respect to the chair rows ahead. People walking in the balcony must not interfere with the light from the projector and the projection booth ports should be located accordingly.

We have explored the general problem of sight lines and floor slopes because here basic problems are involved which must be recognized regardless of the particular type of layout used. All of these basic factors revolve around the individual seat unit and its relation to the projected picture.

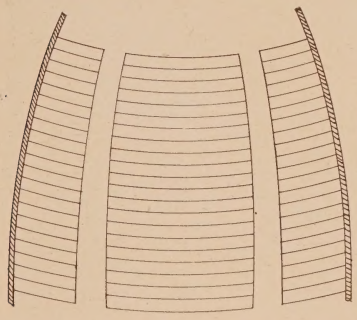
THE MOST EFFECTIVE ARRANGEMENT

Now let us consider the various layout combinations and arrangements in which the seat unit can be placed to obtain the most effective use of floor space in the auditorium with respect to vision, hearing, comfort, safety and convenience.

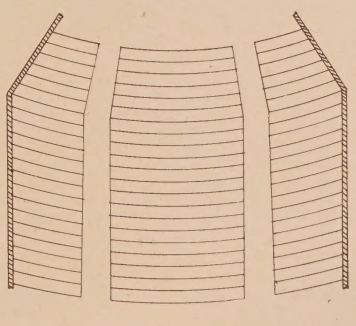
Conventional Rows and Aisles

The majority of existing theatre buildings, including many new houses recently built, have auditoriums with what are described as "conventional" floor layouts. There are several row and aisle combinations. The chair rows may be straight across the entire auditorium, side banks of chairs may be canted, or each row may be curved through the center and side banks. Aisles are straight or curved, parallel or radial. Chair widths usually average 20 inches in the most satisfactory conventional layouts. Obviously, when the space between rows is too narrow and when chairs of minimum width are used, uncomfortable seating is the direct and unfortunate result. This condition is particularly apparent in the balconies of older houses. Many codes now require at least 32-inch spacing and this has generally been considered satis-

THE CURVED LAYOUT follows in general the curvature of the auditorium walls, with the aisles flaring very slightly at the heads. This form of plan is a variation on the fan-shaped seating layout.



THE COMPOUND LAYOUT combines the characteristics of the straight layout (in the center and rear auditorium) and the fan-shaped layout (at the front), with bent aisles conforming to the bend in the walls.



factory where the standard type of theatre chair is used. The push-back type of chair usually requires greater row to row spacing to provide for the fore and aft movement.

The Continental Layout

Any radical departure from the conventional arrangement is somewhat hampered by building code restrictions which vary in different sections of the country. Generally, the building code requirements govern the number of chairs allowed in a bank, chair widths, aisle widths, use of cross-over aisles, degree of floor incline, location and number of exits, size of foyer, and other construction factors directly related to the auditorium layout. Local authorities should always be consulted for code details.

The continental seating layout provides generous row to row spacing and side aisle circulation only. In other words, there is one solid center bank of chairs uninterrupted by conventional aisles except along the wall at each side of the auditorium. The spacing between rows of chairs is 40 inches or more contrasted with the 32 inches usually found in conventional layouts.

Architects have given a great deal of study to the advantages and disadvantages of the continental plan. Its use is generally limited to new theatre buildings with seating capacities up to 1,000 seats. Larger houses usually have to be designed along conventional lines because the continental layout is limited to one bank of chairs. Also, there must always be adequate clearance on both sides of the building for the side exits required.

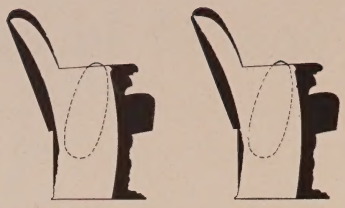
In the continental plan with only two longitudinal aisles, one along each side wall, the obstruction of vision caused by persons walking down the aisles is avoided. The generous spacing between rows helps to improve sight lines and contributes to greater comfort. Each 40-inch space between chair rows becomes a lateral aisle, easing the problem of ingress and egress.

One disadvantage is the loss of seating capacity due to the increased row to row spacing. For example, if the conventional spacing of a 500-seat house with 32 inches between chair rows is increased to 40 inches, the loss in capacity amounts to 100 seats or a loss of 20 per cent.

In reseating theatres, there is the problem of ventilator and aislelight locations which would have to be changed to take care of the continental layout. In many cases it will be necessary to provide additional exits along the side wall and this, of course, would be impossible without adequate free space outside of the building.

CHAIR DESIGN AND USE OF SPACE

Theatre chairs must be constructed to permit satisfactory installation under all of the varying conditions which occur in the building for which they are intended. Likewise, chairs must be designed to provide maximum comfort for the patron during the entire period of occupancy. Obviously, the most satisfactory chair design is based on the human element, the composite or physiological dimensions of the average human body. The functional requirement is a chair which provides for a normal sitting posture while viewing the motion picture.

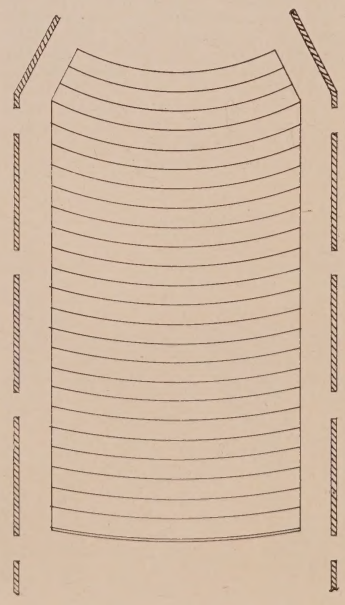


MODERN CHAIR DESIGN offers an economy of space between the rows, without reducing the total number of possible seats in the auditorium. Further advantage is the decreased annoyance to seated patrons.

As space is a real luxury in the theatre auditorium and because the amount of room between chair rows is directly related to patron comfort, it is desirable to have a chair structure which not only fulfills the basic requirements, but also occupies a minimum amount of space from row to row.

The horizontal and vertical curve of the chair back should conform as closely as possible to the contour of the human body. In other words, the chair back should be broad with only a shallow curvature at the shoulders, narrower and deeper at the waist, and vertically formed to fit the curve of the spine. A chair with this design offers a definite economy of space by providing comfortable support with a back of minimum thickness. The space thus gained allows additional room for stretching and relaxing the legs and increases the passing room between rows.

THE CONTINENTAL SEATING LAYOUT provides generous row to row spacing, although it provides for only side aisle circulation. Use of the plan is generally restricted to new theatres up to 1,000 capacity.



Although a great deal of emphasis has been placed on the desirability of more room for passing between rows, there is evidence to indicate that ample sitting room is even more important. By installing tabulators or counters on seats in a test house, it was discovered that normally the seated patron is disturbed not more than twice by other persons entering the row during a feature presentation.

This disturbance, however annoying, is measured in only seconds, while the sitting time usually extends into hours. It follows that provision of more actual sitting space is the more important factor with respect to patron comfort. Consequently, the chair design which allows additional knee, leg and foot room between rows without actually increasing the back-to-back spacing contributes directly to more efficient use of space in the auditorium. The additional knee and leg space is not actually gained, however, unless it remains free from obstructions or any rearward movement of the seat or chair directly ahead.

Another design factor affecting comfort is the width of the seat and back. The back should be as close to full chair width as possible with a minimum amount of open space between chair backs in the same row. There should also be a maximum amount of cushion width for a given overall chair width. Chairs with ungainly seat hinges or those with mechanical complications usually require the use of narrower seat cushions, and the comfort factor is reduced accordingly.

Some interest has been developing for the use of "luxury" chairs 24 inches wide to provide even more comfortable seating —a tendency to transform the theatre auditorium into one large loge section, as it were. Here again, as with the use of 40-inch continental spacing of chair rows, the seating capacity for a given area is reduced and it becomes a matter of judgment for the theatre owner to determine how much of a reduction in seating capacity he can afford, considering, of course, the possible advertising value and drawing power of the luxury-width chair.

It is encouraging to observe that leading theatre architects and chair manufacturers are giving a great deal of thought and study to the functional requirements of the building, the seating, and all of the other equipment components in terms of the individual theatre patron. New buildings are being designed accordingly.

Much can also be done to improve existing theatre auditoriums through more efficient use of the available seating space and by installing new, comfortable chairs designed to fit the human body. It should be emphasized, however, that every building presents a different set of conditions and special problems which should be analyzed carefully to determine what must be done to obtain the best results. With this in mind, it is always advisable to call in a competent architect and get in touch with an established chair manufacturer for specialized engineering and service on seating.

Design and Furnishing of the Small Stage

While Stages Should Be in Original Plans, They Can Be Built into Almost Any Theatre

By C. E. TOMPKINS
President, J. R. Clancy, Inc.

From the beginning of the theatre, it has been continually changing. The very nature of the show business decrees this, and it will continue to change as time goes on.

In view of the changes that have taken place, and are taking place daily in the theatre, would it not seem poor policy so to limit the construction of the stage that only one type of entertainment (pictures) can be presented? Perhaps the best answer to this question has already been amply demonstrated where the small theatres have had to resort to Bank Nite and other innovations to keep up attendance. Or perhaps a star from one of the producing companies is on tour and would like to make a personal appearance, or the owner wishes to cooperate with some civic movement, only to find he has provided no space to make even an announcement to his patrons.

Who knows where television will stop in the theatre field or how large or how cumbersome the equipment may be? And, finally, consider the added re-sale value of the theatre if it has a small, compact, but efficient stage.

WHY STAGES ARE OMITTED

Why is it that better stage facilities have not been provided in more theatres of this type?

Lack of Space

A quick answer to this would be lack of space, but this would be open to debate since 12 to 15-foot depths permit a lot of stage activity, and almost any theatre can provide that amount of space to improve greatly the box-office possibilities. The next answer probably would be height, especially where the theatre is located in a one-story building or an office building with a rented second floor. This, however, is not as great an obstacle as it may seem. It is possible to design a really workable stage with very little overhead height. Such a stage could easily handle all of the activities outlined in the early paragraphs of this article, plus many vaudeville acts and, in fact, many light dramas and comedy shows.

The Cost

The next answer would probably be cost, and here again this is open to debate, for the skeleton or minimum requirements of a stage of this type would be much lower than the owners would likely suspect. After the skeleton stage is once installed, assuming that it is properly planned, new additional equipment could be added if needed. The most difficult problem to overcome is to get the screen and sound horns out of the way for clear use of the stage. The sound horns are easily disposed of by means of a modern roller-bearing sound-horn truck, or, where off-stage space permits, a modern horn-beam track.

Picture Screen

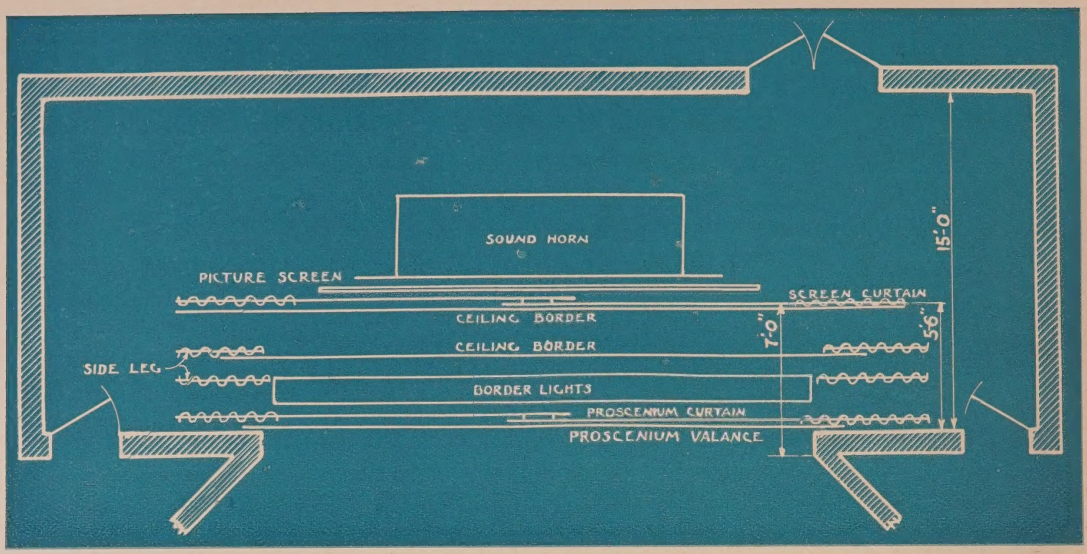
The picture screen, however, is the real obstacle to a stage that does not have fly space. This is a cumbersome piece of equipment and, while a screen suitable for the average theatre can be rolled, rolling is not a satisfactory method, inasmuch as it leaves wrinkles in the screen. Numerous methods have been devised in an effort to find a suitable way to dispose of a framed screen. One used quite extensively in Army camps has to some extent solved the problem. But here again we find we must have some overhead height. Furthermore, this requires too much help to operate.

STAGES WITHOUT O'HEAD SPACE

In considering a stage for the smaller theatres it would seem advisable to divide them into two groups: (1) The small neighborhood theatre, where no overhead space is available, and (2) the medium size theatre where space can be provided to fly the picture screen and similar items.

Stage No. 1 seems to be the logical answer for the small neighborhood theatre. The drawing is made on the basis of a 25-foot proscenium opening, 22 feet high, with an additional overhead space of 5 feet. The overall depth of the stage,

GOOD WILL, WITH ADDED BENEFITS AT THE BOX OFFICE, accrue to the theatre with a small stage. For example, many a special show can be given—such as the special children's matinee here pictured. With such an enthusiastic audience as this, one which enters wholeheartedly into the spirit of the occasion, the theatre cannot help but become a more powerful influence in its community. With stage facilities, it also becomes the center for civic affairs, becoming the point of celebration on special occasions. The stage need not be sumptuous—and many a stage of useful proportions and accoutrements can be economically designed.



STAGES WITHOUT OVERHEAD SPACE have the minimum of equipment, as shown in this diagram. For such a stage, with a 15-foot depth, provision has here been made for the proscenium valance, the proscenium traveler curtain, right and left side legs, border lights, two ceiling borders, a traveler screen curtain, the screen, and the sound horns. With a set-up like this, the theatre would be in a position to handle any local event or celebration and almost any "in the flesh" act making a specialty of the smaller one-night or split-week theatres. The cost of such a stage is reasonable compared with the good will its use would create.

from the front of the apron to the rear wall is 16 feet 6 inches. This latter dimension could be reduced 2 or 3 feet if necessary. The screen curtain is located 7 feet back from the front of the apron. This gives a clear space inside the proscenium wall of 5½ feet, or 7 feet from the stage front, in which to accommodate light acts, speakers, magicians, and the like. In the drawing are shown a valance and proscenium draw curtain. These two pieces of equipment may be eliminated in favor of a contour curtain, which really is a much nicer treatment. The cost is very little more than the valance, draw curtain, and track. Immediately behind this is provided a border light, wired in three colors, followed by a masking ceiling border, followed by another ceiling border, grand drape, and a screen curtain.

Screen Curtain

Of course the screen curtain would have to be of heavy enough material to shut out light. This in turn is followed by the picture screen and sound horns, both of which remain fixed at all times. Both proscenium curtain and screen curtain can be operated either from stage or projection booth. In a few instances, architects have found it convenient to provide a pocket overhead to fly the picture screen; and, where this can be done, the entire area may be opened up all the way back to the rear wall, for stage activities and various types of equipment.

Asbestos Curtain

Some cities will insist upon an asbestos curtain on a stage of this type, in which case a braille type curtain would be permissible. In most cases, however, where proper plans are submitted and an efficiently flame-proofed treatment is assured, theses restrictions are waived, and the asbestos curtain can be eliminated. The foregoing layout applies only to stages where there is no appreciable room overhead in which to fly the picture screen and is generally confined to the small neighborhood theatres.

Costs

The cost of a stage of this type depends on the width and height and the materials used; but, in any case, it would run very little more than the equipment required to accommodate pictures only.

STAGES WITH OVERHEAD SPACE

We have discussed at length the possibility of providing some sort of working stage in a building without overhead space for flying the equipment.

Equipment

The real answer, however, to the stage problem for small theatres lies in drawing No. 2. It will be noted that this stage can be built to a depth of 14 feet, or 18½ feet, or, in fact, deeper if desired. The minimum equipment for this stage is as follows: (1) valance, (2) asbestos curtain, (3) proscenium draw curtain, (4) concert border light, (5) grand drape, (6) main act curtain, (7) picture screen, (8) sound horns, (9) ceiling border, (10) side legs, (11) border light, (12) ceiling border, (13) draw curtain, (14) border light, and (15) back drop.

If it is desired to limit the depth to 14 feet, then the rear border light and back drop are eliminated. Also the valance and proscenium curtain may be eliminated in favor of a contour curtain.

Proscenium Opening

In this type of stage, sufficient space in which to fly the picture screen is necessary, but it does not follow, as most people seem to believe, that the overhead space should be twice the height of the proscenium opening, since it is only necessary to lift the screen high enough to mask it behind the grand drape. The grand drape, placed on a counter-weight set, can be raised or lowered quickly and easily. It is used for masking the top of the picture screen while the screen is in use, and, in most theatres, it is necessary to lower it to trim properly for acts, at which time it usually rides about 18 inches below the valance, and since the valance hangs 2 to 5 feet lower than the proscenium opening, the sum of these two factors reduces the overhead height necessary to fly the screen accordingly.

Gridiron

The question of establishing the height of the gridiron is one that cannot be determined until the general plan for the auditorium has been developed. The slope of the main floor, the balcony, if any, and the height of the projection room portholes all play important parts in establishing the height of the proscenium opening, and in general, the height of all drapes and the like on the stage, as well as the proper location of the picture screen. Therefore, it is imperative that a detailed stage plan be carefully worked out to tie in with the general construction of the building. Usually, the proscenium opening is a little higher than absolutely necessary in order to give the proper effect to the valance and front curtain.

Having developed the height of the proscenium opening, and a general stage

layout based on this height, the overhead height for flying all equipment can be easily determined. However, in a majority of cases, it is found there is more space provided than is absolutely necessary and this, of course, should be avoided in the interest of economy.

The type of gridiron is next to be considered and this type of stage will operate satisfactorily from either the underhang type or the upright type. Experience, however, shows that the upright type is most economical, safest and most satisfactory.

The amount of space from the gridiron to the roof need not be more than 5 feet between the roof girders. On this type of stage, all stage-operating equipment comes down to the floor and no fly lofts are required. The control board is panelled in the proscenium wall and thus takes up no stage space, and is very handy for operation. The number of sets as listed above is ample for most productions, but additional sets may be added at a later date if desired.

Fire-Proof Curtain

On a stage of this type an asbestos curtain is required, although there are cases where this requirement has been waived. This would seem to be a poor policy, since the insurance underwriters recognize the value of a properly working asbestos curtain and make allowance for same in their rates. The liability companies, however, do not make any allowance in their rates, in spite of the fact that, in case of fire, the flow of smoke and gases into the auditorium would blind the audience and stifle their efforts in getting out. This has happened in many theatre fires and, of course, the failure of the liability companies to recognize the value of fire curtains does not exempt the owner from liability claims and actions. It would, therefore, seem that the owner for his own protection should insist upon a fire curtain, regardless of the size of the theatre.

Proscenium Decoration

Since the patrons enter the theatre facing the stage and sit facing the stage, the emphasis on interior decoration should be centered on the proscenium. Oftimes we see a beautiful proscenium with a cheap valance and a curtain which does not harmonize with the rest of the interior. All eyes are focused on this point and the public is quick to detect any shortcomings. The front curtain and valance, or other treatment of the proscenium opening, therefore, should be of such quality and workmanship that it will instantly appeal to the public.

Contour Curtains

Contour curtains are fast taking the place of the proscenium draw curtain and valance, and make a very attractive treatment of the proscenium opening. The non-selective contour curtain is not expensive, particularly when taking into consideration that it eliminates the customary valance, drawing curtain, and track.

The contour curtains may be operated from the projection booth or from the stage since they are motor operated.

There seems to be a desire on the part of many architects to use a curved proscenium opening and this type of proscenium can often be made very attractive, but it does not adapt itself very well to draw curtain track operation. Contour curtains, however, can be installed and operated on any radius. The proscenium curtain should be opaque, which effect may be obtained by using either heavier velours unlined, or the finer silks and satins properly lined. This is also true of the screen curtain when stage activities are to be carried on back of such curtain. Other drops, side legs, and so forth may be made from the cheaper materials such as rep, and the color should lean toward neutral shades to enable the lighting to produce the best effects.

Lighting

The lighting for stages of this type need not be expensive. However, it should be remembered that cheap lighting equipment is always the most expensive. The stage floor should be provided with suitable outlets for plugging in spotlights and the like, and there should be a few extra circuits available at the switchboard.

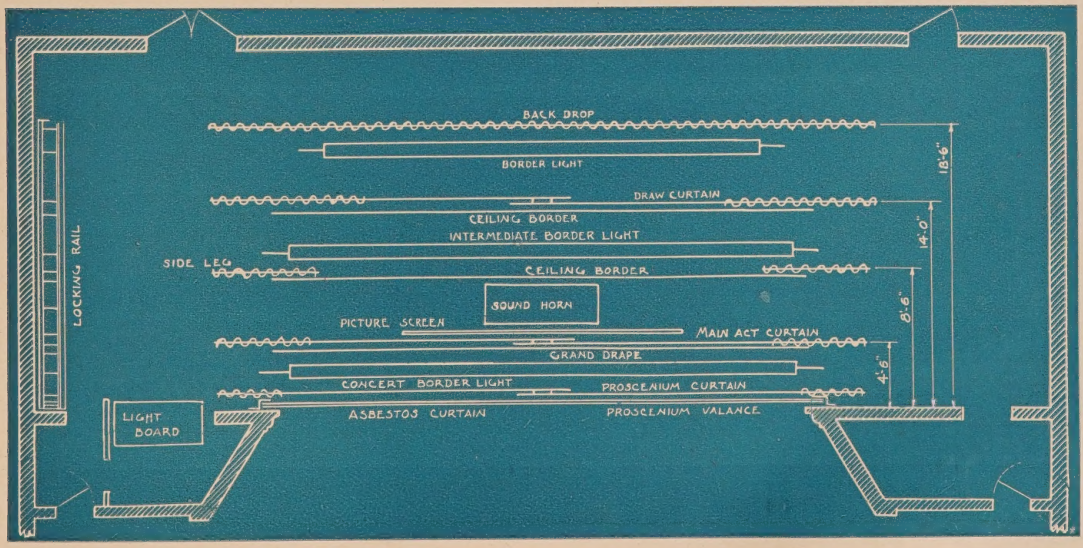
CONCLUSION

In this proper design of a stage there are a great many considerations and no two stages are exactly alike. There is no stock plan which will serve all types of stages. It follows, therefore, that the best and safest way to build and equip a stage is to design it very completely in advance, particularly when we take into consideration that space must be found for much other equipment such as hot and cold air ducts, water and steam pipes, and the like.

All of this equipment must be fitted in in such a manner that the stage may be easily and efficiently operated.

This can be done in all cases when proper thought is given at the proper time. The proper time is before the steel plan for the building is drawn.

STAGES WITH OVERHEAD SPACE are, of course, more sumptuously equipped, especially because of the ability to fly equipment. Here is a diagram for such a stage, utilizing an asbestos curtain, proscenium valance, the proscenium traveler curtain, concert border light, grand drape, main act traveler curtain, screen, sound horns, ceiling border, intermediate border light, ceiling border, draw curtain, border light, and back drop. This equipment, together with scenery, makes the stage available to practically anything short of a Ziegfeld extravaganza—and even these might be successfully staged in tabloid form with this equipment.



Fire Protection Equipment for the Theatre

What Fire-Fighting Equipment is Needed And How it is Used is Clearly Explained

By Arthur G. Sullivan

President of the Chemical Fire Extinguisher Association

Fire extinguishers are provided for general protection against incipient fires and for safeguarding specific hazards which are known as likely points of origin for fire. Before suitable extinguishers can be selected for these purposes, it is necessary to know something of the nature of fire, the means by which it may be extinguished, the extinguishers which provide these means, and what kinds of fire may occur in the theatre and where.

In order to have a fire, there must be sufficient heat and sufficient oxygen, in addition to a material that will burn. To put out a fire, therefore, either the heat or the oxygen must be removed from the burning material. To reduce the heat, extinguishers which provide water or chemicals in water solutions are used, since water is a highly effective cooling medium; to remove the oxygen, an extinguishing agent which will separate the burning material from its air supply is necessary. With some kinds of fire, either method may be used, but this is not true of all fires and the method employed will be determined by the nature of the materials involved.

TYPES OF FIRES

Fires in ordinary combustibles—paper, cloth, wood, and similar materials—are defined as Class A fires. They can be put out by either the cooling or the smothering method, but cooling is the more effective.

Fires in flammable liquids—gasoline, oil, kerosene, paint, grease and the like—are designated as Class B fires. They are best extinguished by smothering.

Fires in live electrical equipment are known as Class C fires. Since the application of water to such fires may damage the equipment and endanger the fire fighter, it is essential to use extinguishing agents that are non-conductors of electricity.

Extinguishers which may be used on Class A fires only are the pump tank, the soda acid, and the gas cartridge types.

Those which may be used on both Class A and Class B fires are the foam and the loaded stream types.

Those which may be used on Class B and Class C fires are the vaporizing liquid and the carbon dioxide types. These may also be used successfully on small Class A fires where there are no drafts or air currents, if the fires are not too deeply entrenched.

FIRE PROTECTION EQUIPMENT

Every approved fire extinguisher bears an Underwriters' Laboratories' label that indicates the class or classes of fire for which that extinguisher should be used and the number of extinguishers of that capacity which are considered necessary to comprise one unit of protection. The symbols, "A-1, B-1," for instance, on the Underwriters' inspection label mean that the extinguisher so labeled is approved for use on Class A and Class B fires and that it constitutes one unit of protection for either class of fire. The relative amount of fire protection afforded by the different types and sizes of portable extinguishers has thus been standardized according to units, and the number of units required in any particular location depends on the severity of the incipient fire that may be anticipated. While most of the approved types of extinguishers are made in more than one size, only the most common sizes will be discussed here.

Pump Tank

The pump tank contains plain water which is discharged by means of a built-in hand pump. Anti-freeze chemicals approved for the purpose may be added to the water. One 5-gallon or two 2½-gallon extinguishers are rated as one unit of protection.

Soda Acid

The principal extinguishant in the soda acid type is water. Pressure is generated when bicarbonate of soda (dissolved in the water) and sulphuric acid (in a bottle suspended in the neck of the extinguisher) are mixed. The mixing takes place when the extinguisher is inverted. One 2½-gallon extinguisher is rated as one unit of protection.

Foam

The foam extinguisher, which is shaped exactly like the soda acid, contains a solution of bicarbonate of soda and a foam stabilizing material dissolved in water and, in an inner cylinder, a solution of aluminum sulphate in water. When the extinguisher is inverted, the mixture of the two solutions generates pressure for the discharge and at the same time creates foam which blankets the burning material and smothers fire.

THE SODA ACID EXTINGUISHER acts through the pressure created when sulphuric acid acts on sodium bicarbonate dissolved in water. When the extinguisher is inverted, these two chemicals react, and the carbon dioxide formed forces out the water. The 2½-gallon extinguisher is rated as one unit of protection. It should be serviced immediately after use, or at least once a year, to make certain that it is always ready for action.

Because so much of the foam is water, it is also an effective cooling medium.

Soda acid and foam extinguishers must not be exposed to freezing temperatures, and if kept in unheated areas should be placed in suitably heated cabinets. Anti-freeze chemicals must never be added to the contents.

Gas Cartridge and Loaded Stream

In gas cartridge and loaded stream types, a small cartridge of carbon dioxide gas in the neck of the extinguisher supplies the means of discharge of the extinguishing agent. The gas cartridge type contains water as the extinguishant, to which anti-freeze chemicals approved for the purpose may be added. The loaded stream type contains a solution of water and an alkali-metal-salt mixture which will not freeze down to 40 degrees Fahrenheit below zero. One 2½-gallon extinguisher of either type is rated as a unit for Class A fires; for Class B fires, two loaded stream extinguishers of 2½-gallon capacity constitute a unit of protection.

Vaporizing Liquid

The vaporizing liquid extinguisher contains specially processed carbon tetrachloride, which forms a heavy vapor on contact with burning materials and thus smothers fire. It is a non-conductor of electricity and does not freeze down to 50 degrees Fahrenheit below zero. Two 1-quart extinguishers are rated as a unit of protection for either Class B or C fires; one 1-gallon extinguisher is a unit of protection for Class C fires.

The 1-, 2- and 3-gallon extinguishers of the vaporizing liquid type are carried by a handle at the top and operated either by a hand pump or by stored pressure. The hose should be held with one hand and the pump or valve manipulated with the other. The valve for the stored pressure type is located on the head casting.

Carbon Dioxide

The carbon dioxide extinguisher contains liquid carbon dioxide which is discharged as a gas which smothers fire. It is a non-conductor of electricity and requires no protection from freezing temperatures. One 15-pound extinguisher is a unit of protection for either Class B or C fires.

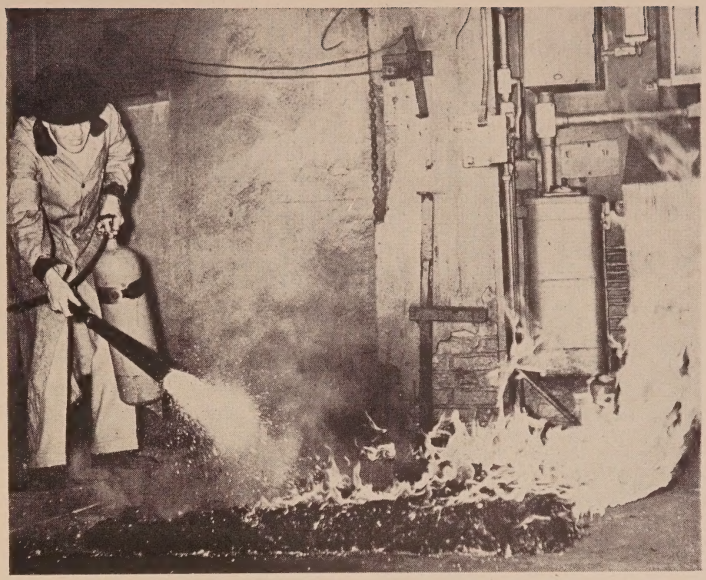
PROTECTION OF POINTS OF HAZARD

With the basic knowledge of the classes of fire and their respective extinguishing agents now in mind, let us examine the theatre to determine what protection its points of hazard require.

Projection Room

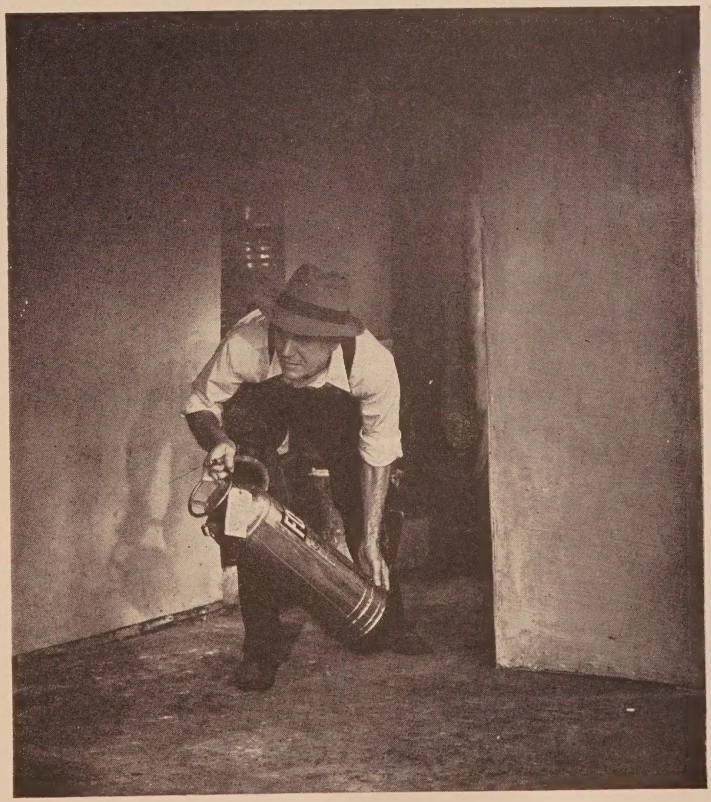
First and most important is the projection room—source of 50 per cent of theatre fires. This is the only room in the building for which there are well established regulations with respect to fire protection equipment, and theatre operators will naturally be guided by them.

In addition to whatever automatically operated equipment may be installed to meet the regulations, there should be at least one hand extinguisher for Class A fires and one for Class C fires immediately outside the projection room. In some states, it is required that a Class C



THE CARBON DIOXIDE EXTINGUISHER (above) contains the gas in liquid form. When the pressure is released, turns into a gas which smothers the fire. Carbon dioxide neither conducts electricity nor freezes in cold weather.

THE FOAM EXTINGUISHER, shaped like the soda-acid extinguisher, also contains sodium bicarbonate in solution and, in addition, a foam stabilizing material. Instead of the acid, there is aluminum sulphate. When the extinguisher is inverted, and the two materials mix and pressure is created and there is discharged a foam which blankets the burning material and smothers the fire. These extinguishers should be recharged after use.



extinguisher be available inside the projection room, to take care of any fire that may start in the projection machine. However, fire extinguisher manufacturers believe that some of the unfortunate fire accidents which have occurred in the theatre could have been prevented had the projectionist been required to leave the room to obtain the extinguisher.

In this connection, the opportunity to take issue with certain statements often made in the motion picture field seems too good to resist.

Some rather wild charges have appeared in print regarding the hazards of using a vaporizing liquid extinguisher in a projection room. To be sure, the liquid sometimes produces small amounts of toxic gases, at certain temperatures, but the real hazard lies in fighting fire by any means inside a projection room. Once a fire starts there, regardless of its cause or point of origin, it is almost inevitable that the film will be involved. Attacking such fire inside the room is dangerous because of the flash ignition, the hazardous depletion of oxygen which necessarily occurs when there is a fire in a confined space, and the toxic gases given off by the burning film. Under such circumstances, the additional hazard that may be introduced by the use of an extinguisher is negligible.

If the projectionist is forced out of the room to get an extinguisher, however, he can attack the fire through the doorway, where he can escape entrapment by the flames and is unlikely to be exposed either to air deficient in oxygen or to toxic gases.

Audience Areas

Fires in the balcony, mezzanine, lobby, and main auditorium are caused primarily by live cigarettes or matches in contact with paper, upholstery, carpeting or woodwork. Extinguishers for general protection of ordinary combustibles should, therefore, be provided. At least one Class A unit should be available at each exit sign and additional units, if necessary, so located that a person will have to travel no more than 40 or 50 feet from any point to reach an extinguisher. Toilet rooms, lounges and smoking rooms should also be given Class A protection.

Theatres which have spotlights located on the gallery or balcony should have at least one Class C extinguisher near the equipment.

Back Stage

Backstage areas contain combustibles of a Class A nature, but extra precautions may be necessary if there is an abundance of flammable materials, such as curtains, scenery, ropes and other accoutrement. Class A extinguishers are therefore advisable in each wing and back of center-stage, and along each tier of dressing rooms. They should also be placed at each end of the catwalk in the loft so that it will be necessary to travel only a minimum distance to an extinguisher in case of fire in that area.

The backstage control board, with its mass of wiring, is a hazard that requires Class C protection.

Paint Shop

If there is a paint shop, at least one Class B unit should be provided and whenever any painting is done backstage, at least one Class B extinguisher is advisable for "stand by" protection against spill fires or flashback fires from the vapors. The same is true where flammable cleaners are used, for the vapors from flammable liquids, being heavier than air, will drift along the floor and may reach a cigarette or an electric spark. Ignited vapors have been known to flash as far as 300 feet back to their source to start disastrous fires.

Other Locations

Oil furnaces and fuel-oil storage rooms present obvious Class B hazards. Fuse boxes, transformers, circuit breakers and the motors that drive cooling and air conditioning systems are, of course, Class C hazards. The property room and musicians' room need Class A protection, as does the woodworking shop.

Extinguisher Placement

When extinguishers are provided to safeguard a specific hazard, they should be mounted near, but not immediately on or adjacent to, the hazard. Otherwise it may be impossible to get the extinguisher if the hazard should take fire. The extinguishers should be plainly visible or their locations conspicuously marked; and access to them should never be blocked under any circumstances. Easily handled units should be installed so that their tops are not more than 5 feet from the floor, and heavy units not more than 3½ feet from the floor.

PUMP TANK EXTINGUISHERS are carried to the fire by means of a handle at the top. The hose is directed with one hand, while the pump is operated with the other. Tank contains water, with anti-freeze added. One 5-gallon or two 2½-gallon extinguishers of this particular type are rated as one unit of protection. Follow the manufacturer's instructions when it comes to servicing this extinguisher, as well as for any other fire-fighting equipment.

OPERATION OF EXTINGUISHERS

With the danger points protected by extinguishers of the proper type and number, it follows that the theatre employes must know how best to use the equipment. Fire extinguisher demonstrations should be held periodically for the entire staff. The local department will usually be willing to supply one of its men in uniform for this purpose, but new employes should be familiarized immediately with the operation of extinguishers by means of printed material or oral explanation.

Soda Acid and Foam

To operate a soda acid or foam extinguisher, take the hose in the crotch between the thumb and index finger of one hand and grip the ringtop handle with the same hand. Then, with the other hand grasp the bottom of the extinguisher and lift it off its hanger or shelf. Carry it to the fire by means of the ringtop handle, maintaining a grip on the hose nozzle. To discharge the contents, take hold of the handle in the bottom with the free hand and turn the extinguisher upside down, releasing the ringtop handle with the other hand but

keeping a firm grip on the hose nozzle so that the stream can be controlled instantly.

Gas Cartridge and Loaded Stream

Gas cartridge and loaded stream types are handled the same way, except that the extinguisher must be bumped on the floor or some other hard surface when inverted, so as to rupture the gas cartridge and release the gas it contains to expel the extinguisher stream.

Pump Tank

Pump tank extinguishers are carried to the fire by means of a handle at the top. The hose is directed with one hand while the pump is operated with the other.

Vaporizing Liquid

Vaporizing liquid extinguishers of the 1- to 2-quart size are usually mounted in wall brackets. With one hand, seize the handle, pull it from the bracket, and lift the extinguisher out of its bottom support. Grip the bottom of the extinguisher with the other hand, spraddling the nozzle with the index and middle finger. Give the handle a twist to the left to unlock it while carrying the extinguisher to the fire. Pump steadily and vigorously to expel the stream.

Carbon Dioxide

Carbon dioxide extinguishers are carried by a handle immediately over a release lever near the top of the cylinder. The larger units must be placed on the ground near the fire and the locking pin pulled out of the valve. Then the discharge horn is directed at the fire with one hand while the release lever is squeezed with the other. Care should be taken to hold the discharge horn only by the grip designated, for the escaping gas produces a refrigerating effect on the metal parts of the horn that will produce a "burn" effect to the operator's hand if these metal parts are touched in operation.

FIRE FIGHTING

In fighting Class A fires the stream should be directed at the base of the fire, not at the smoke or flames. Application should be continued until the fire is completely out and any sparks or glowing embers are thoroughly drenched.

Fires in flammable liquids (Class B fires) usually occur in either containers or spills. If foam, vaporizing liquid or a loaded stream extinguisher is used on a Class B fire in a container, the stream should be directed against the far, inside wall of the vessel just above the burning surface so as to permit a natural spread of the extinguishant back over the burning liquid without splashing. If possible, the operator should walk around the container while directing the stream so that the surface will be covered from all sides. The stream should never be aimed directly into the liquid.

If carbon dioxide is used, the discharge should be directed over the near wall of the container (not into the liquid) as close to the burning surface as possible, and the discharge horn moved slowly from one side to the other. The discharge should be continued until all possibility of reflash is over.

Spill fires are fought by starting at a point opposite the source of the spill and slowly sweeping the fire out while advancing toward its source. The spill fire should be completely out before flames in a container are attacked.

Fires in electrical equipment should be fought in the same manner as those in ordinary combustibles, although it is best to turn the current off first to prevent reignition. With vaporizing liquid or carbon dioxide, the operator can approach as close to the fire as necessary before the switch is pulled. If water or water-solution extinguishers must be used, it is imperative that the equipment be made electrically dead before application begins.

General Rules

There are a few general rules that should be followed by anyone who attempts to fight a fire. The operator should be careful first of all to stay as far from the flames as fire conditions and the effective range of the extinguisher will permit. With a 2½-gallon soda-acid extinguisher the discharge carries a horizontal distance of from 30 to 40 feet; with a 15-pound carbon dioxide extinguisher the range is 6 to 8 feet.

Secondly, the operator should maintain his position between the fire and a means of exit so that his escape will not be cut off by a sudden burst of flames.

If the fire is in a small, unventilated room, such as a storage or basement room, the safest procedure is to fight the fire from a doorway or window. All fires, especially those that occur where ventilation is poor, generate large quantities of carbon monoxide and other deadly gases. More people are killed in fires by poisoning and suffocation from smoke and gases than by burns. In theatres where ventilating systems cause strong air currents, however, the system should be shut down immediately upon the start of a fire so as to avoid feeding it fresh oxygen and causing it to spread.

Servicing Extinguishers

To be ready for instant use extinguishers must be inspected frequently, refilled immediately after use, and completely serviced at least once annually. This servicing need not be done all on one day, but can be carried on at spaced intervals and the dates entered on the inspection tags attached to each extinguisher. Soda acid and foam extinguishers must be recharged annually, if they have not been used and refilled during the year. Other types need recharging only after use. Replacement and recharging materials made by the manufacturers of the respective extinguishers should be employed.

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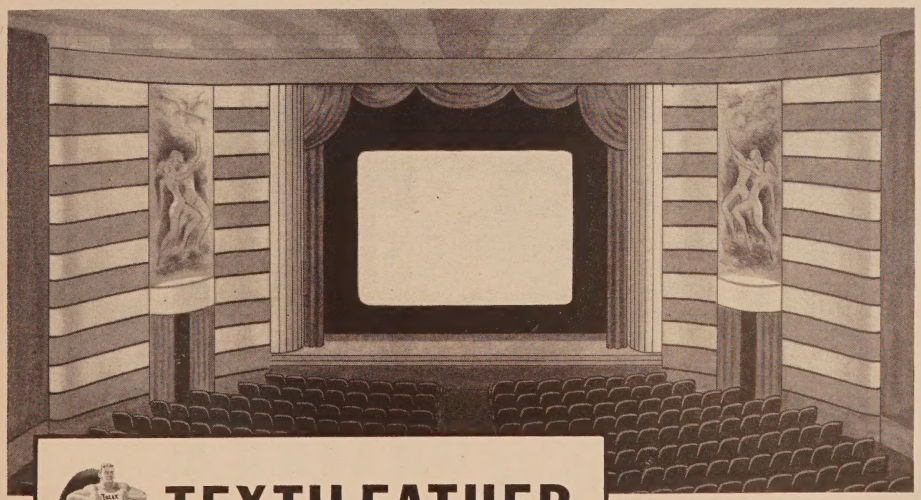

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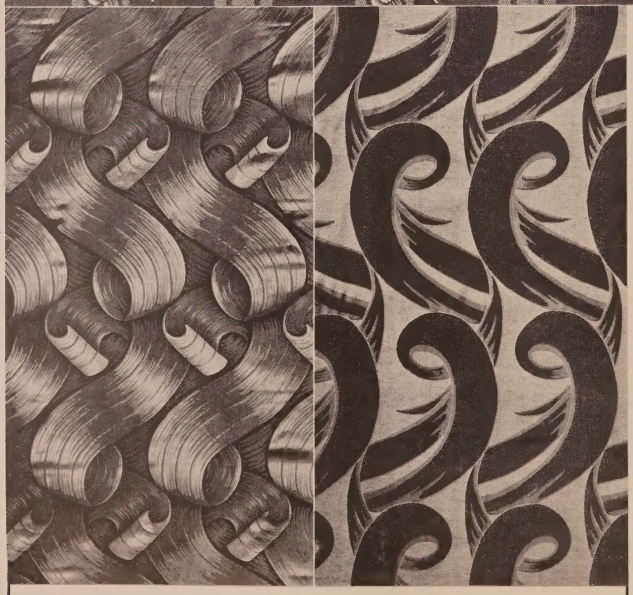

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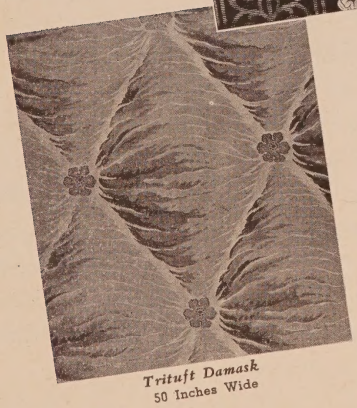

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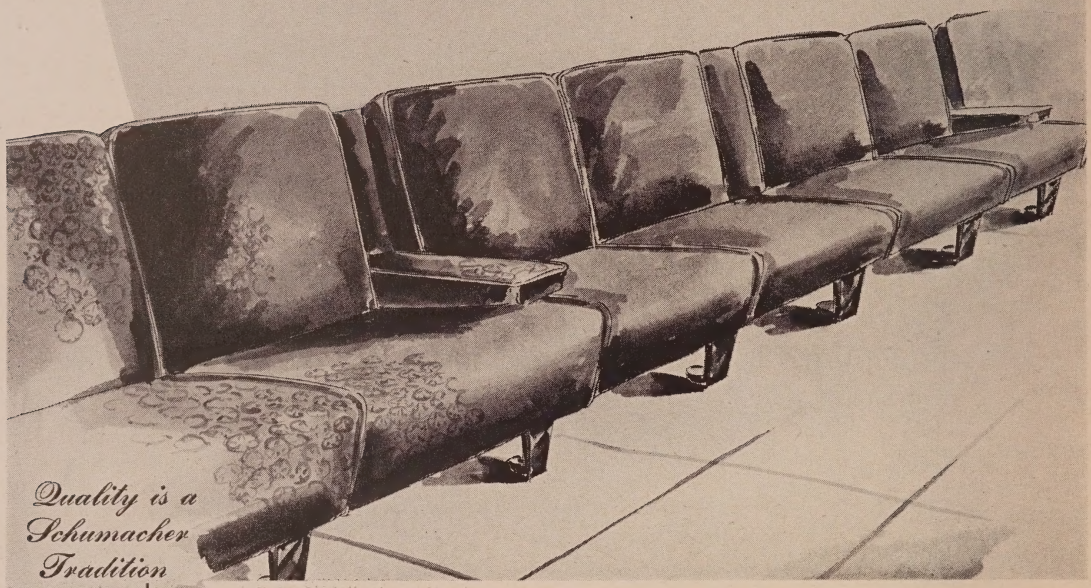

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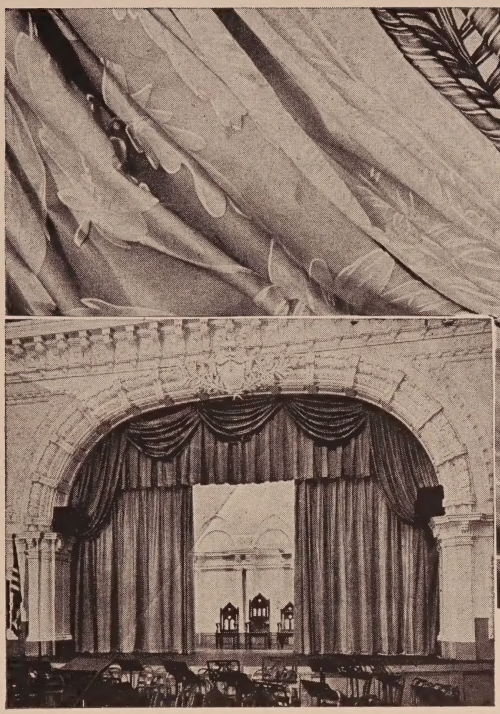

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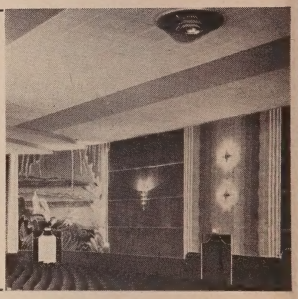

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☐ **ROUGH SKETCH and DIMENSIONS**

☐ **DETAILED DESCRIPTION and DIMENSIONS**

NAME.....**TITLE**.....

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TELEPHONE NO......

Stage and Auditorium Draperies • and All Other Fine Decoration

HOW OUR MAIL ORDER DEPARTMENT OPERATES:

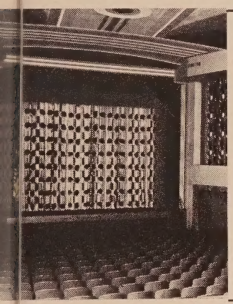
e st essful operation of a broad scale studio equipped to create, paint, fabricate, hol r, sculpture, or etch into one harmonious plan, each decorative feature of nd s of theatres per year; necessitates a large staff of DESIGN ARTISTS, PAINTS as DECORATORS, DRAPERY SPECIALISTS, ETCHERS and SCULPTORS, and many or an and apprentices serving each. While their production volume is unlimited, has always been restricted by the speed with which installation crews could tack, il cement into place the finished art items shipped to them; and current difulti of travel, housing and communication have added further obstructions. To circumvent these difficulties, and continue the volume necessary to maintain e c tive staff adequate to the high level of achievement which we have established over 27 years; we have successfully experimented with a Mail Order Plan

In operation it can be either: (1) COMPLETELY MAIL ORDER at great distances with the particular detail or item created from blueprints, sketches, dimensional plans or photographs, and crated and shipped with complete installation instructions or (2) MODIFIED MAIL ORDER in less remote locations, with our decorators travelling to the project and making their own measurements and recommendations, but shipping the finished units to the owner, architect or contractor for final installation. Many combinations of this service, such as the return of the decorator or the sending of a supervisor to watch and advise the installation, can be worked out on any particular project.

The results however, are the same. A saving to the theatre owner of INSTALLATION COSTS which often equal the costs of design, fabrication and shipment; yet a superiority in creation, a theatre-wise knowledge that produces perfect results in beauty and harmony, and a freshness and modern charm that is certain to be recognized in any locale; but only possible to accomplish by a broad scale studio of vast and experienced talent.

May this new department serve you?

ANYWHERE IN THE WORLD—*Mail this card!*



STAGE DRAPERIES

There are many tricks of stagecraft that can be exhibited in a set of stage draperies. The stage opening can be made to appear larger, smaller, higher, lower, or to blend without a marked line into the side walls. Curtain track and curtain control equipment can be shipped with full instructions.

TAILORED TO ORDER IN A VARIETY OF FABRICS, COLORS, AND DESIGNS

AUDITORIUM DRAPERIES

Over exit door and in standee areas, foyers and rest rooms, such small draperies are invaluable in tying together the decorative scheme. The perfection of the Austrian drapes here shown resulted from the proper weight and texture of fabric, plus skilled craftsmanship. Shipped complete with all installation instructions.

TAILORED TO ORDER IN A VARIETY OF FABRICS AND COLORS

LEATHERETTE PADDED WALL SECTION PANELS

For a rich effect in lobbies or foyers, and of fair acoustical value on the back wall of auditoriums, these sections are not expensive, considering the plastering saved, if they are installed over the studding. Display frames or plaster plaques can be easily countersunk at will. Easy to install.

AVAILABLE IN MANY COLORS, SHAPES, AND SIZES

SPECTACULAR EFFECTS IN ANY REQUIRED DESIGN

If a set of plans is available, distance is unimportant to the size or intricate nature of any decorating project. Every item of drapery, quilting or festooning shown in this illustration was cut, fabricated and tentatively assembled in our studios before being shipped out for final installation.

SPECIALLY CREATED FROM PLANS OR SKETCHES AND SHIPPED IN UNITS

ne Interior Decoration!

Studios, Inc.

W YORK 23, NEW YORK

ARE YOU PLANNING A NEW INTERIOR? ...THEN CONSIDER FLUORESCENT MURALS!

GIVE YOUR THEATRE *New Beauty* WITH BLACK LIGHT

SEND FOR YOUR DESCRIPTIVE PRICE LIST TODAY SEE HOW YOU CAN MAKE YOUR THEATRE MORE ATTRACTIVE YET KEEP WITHIN YOUR BUDGET

YOUR PATRONS will exclaim over the rich beauty of BLACK LIGHT, just as theatre-goers all over the United States have, because BLACK LIGHT introduces a new world of color not visible under ordinary illumination. It transforms even an average theatre into a richly glowing realm of mysterious beauty.

BLACK LIGHT activates certain substances in the decorations, causing them to glow. The audience never sees its source . . . its beam is invisible. All the audience sees is a wide variety of luminous color in harmonious contrast to the darkness of the auditorium.

THE DECORATIVE POSSIBILITIES are unlimited. Proscenium, side walls, ceiling, exit door . . . all are good spots for unique and refreshing BLACK LIGHT decorations.

WE SPECIALIZE in theatrical effects and carry a complete and widely varied stock. With BLACK LIGHT, fluorescent satins can be elaborately draped. Paints and lacquers, papers, fabrics, plastics and other fluorescent media are easy to use.

Seasonal displays for Theatre Anniversaries, Hallowe'en, New Year's Day, and almost any occasion will give your theatre distinction at low cost.

Our consultants will be glad to advise theatre owners, managers, designers or decorators regarding the size and type of units needed . . . and their correct placement to get the best results. The actual job can be handled by any decorator or designer. All lamps work at 110 AC through a transformer which is provided and can be plugged into existing outlets without special wiring.

THE PRICE of BLACK LIGHT is nominal . . . even small theatres can afford it. Lacquers and paints are inexpensive and will last as long as any other kind of paint.

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67 East Lake Street Chicago, Ill.

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A NEW NAME IN THE FIELD
OF THEATRE *Decoration*

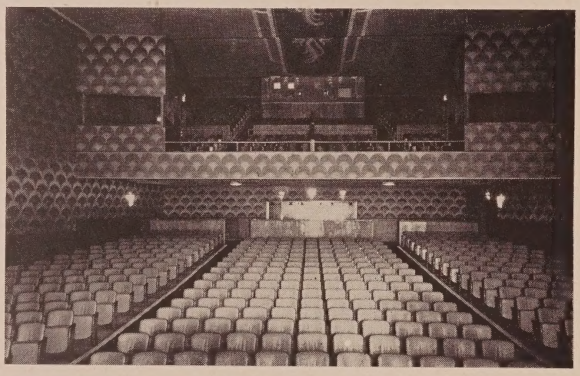
DOROTHY DRAPER'S TALENTS, WIDE EXPERIENCE AND ORIGINAL POINT OF VIEW HAVE GIVEN HER A UNIQUE PLACE IN THE PROGRESSIVE AMERICA OF TODAY

Dorothy Draper Inc.

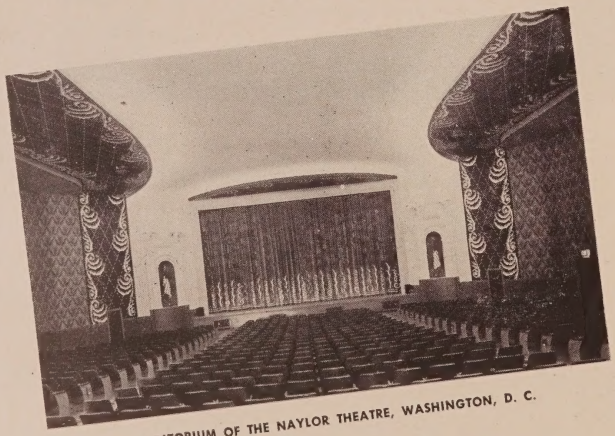
38 EAST 57th STREET, NEW YORK CITY . . . .

To facilitate inquiry re the above, please mention this volume and page number.

AUDITORIUM OF THE LANGSTON THEATRE, WASHINGTON, D. C.



AUDITORIUM OF THE REESE THEATRE, HARRINGTON, DEL.



AUDITORIUM OF THE NAYLOR THEATRE, WASHINGTON, D. C.

We want You to Know

Some facts on the service it was our pleasure and privilege to render theatre-owners during the war years.

Though materials were drastically curtailed, though the labor situation was discouraging, Paramount devoted all its energies to fulfilling the exhibitors' urge for a modernized theatre.

In 1944-45 alone, we of Paramount redecorated 123 theatres in addition to the installation of over 80 percent of the newly built theatres, the greater part of theatre decorating accomplished in our territory.

We feel justly proud of our efforts and accomplishments because through them we have progressed. With this progression comes finer talent and ideas for the execution of the best in Peacetime theatre decorating.

◀ VIEWS OF SEVERAL RECENT INSTALLATIONS

Paramount Decorating Co.

311 NORTH THIRTEENTH STREET • PHILADELPHIA 7, PA.

JACK SEIDMAN *DAVID BRODSKY*

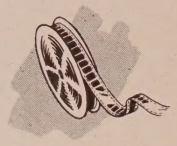
WILLIAM RISEMAN
ASSOCIATES

WRENTHAM MASS • • • • •

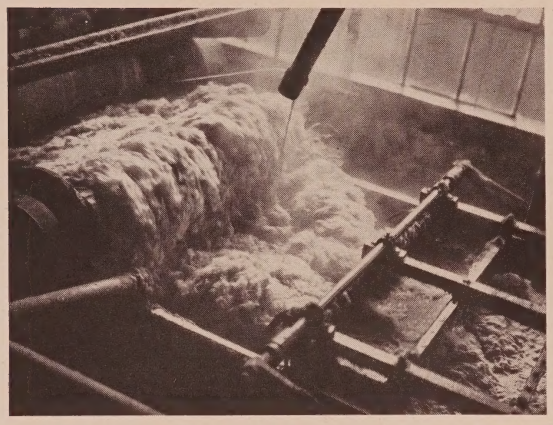
DESIGNERS
BUILDERS
DECORATORS

• • • • • THEATRE INTERIORS

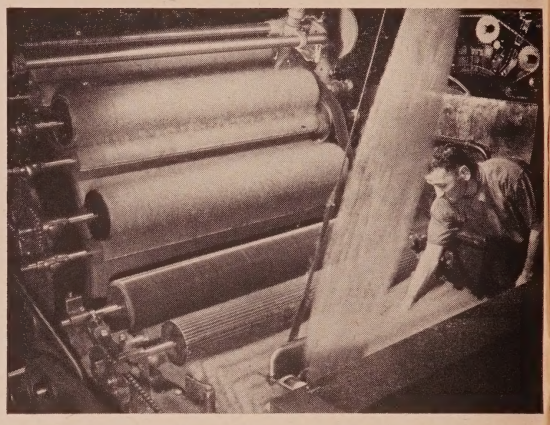
Behind the Scenes with



Like every boxoffice hit—it's the *quality* of production that counts. The *exactness* of detail, the many unseen and unsung quality controls that guarantee finished satisfaction. Here are some of the "behind the scenes" production steps that go into the weaving of a quality carpet you *know* you can count on. These are some of the reasons why Crestwood's *demonstrated durability* has made it America's No. 1 theatre carpet.

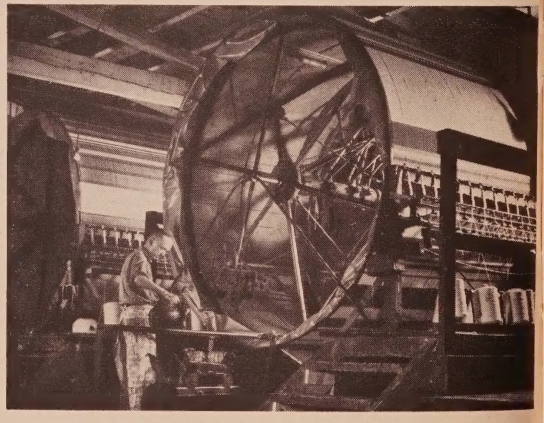


SCOURING—The Crestwood process requires that *only* white wool . . . stronger, more durable, more resilient yarns can be used. These yarns go through many scouring baths before they pass the Crestwood test.



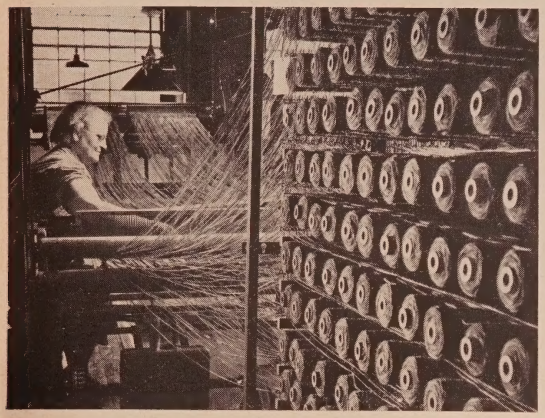
CARDING—Selected yarns are then carded and combed until perfect uniformity is obtained in size and weight. They *have* to be for Crestwood quality.

SPINNING—Wool yarn is spun into shanks. Each strand is tension-tested and *only tough, long-fibre quality wool will meet this Crestwood standard.*



DYEING—*Continuous* strands of wool yarn are wound *under tension* on drums for dyeing. Inferior, short fibre wool would break under the strain of the tension necessary to keep these strands from overlapping.

Crestwood Carpet Production



SETTING—Skilled craftsmanship and painstaking care go into the setting of the brilliantly dyed yarns to make possible the *vivid range of colors* and *intricacies* of the Crestwood designs.

WEAVING—In the weaving of Crestwood carpet *every ounce* of wool is in the *surface* of the carpet, where the carpet gets the wear.

FINISHING—Every yard of Crestwood carpet is subjected to a *fine-tooth-comb inspection* for imperfections and for matching. Here any manufacturing defects, however slight, which become apparent, are corrected.

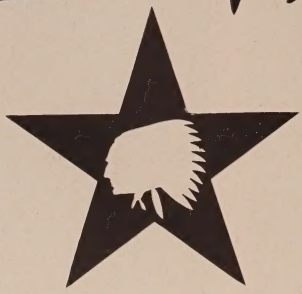
WEAR TEST—*There is no guess work* about the wearing qualities of Crestwood carpet. Here precision gauge instruments measure the wearing away of the pile. *Every fabric* undergoes a *rigorous* testing — *careful research* discovers factors that contribute increased wear value.

A step-by-step preview showing why Crestwood Carpet will continue to be America's No. 1 Theatre Carpet

ALEXANDER SMITH & SONS CARPET COMPANY

295 FIFTH AVENUE, NEW YORK 16, N. Y.

MOHAWK *Presents*



"TRAFFIC-TRED"

An ALL-STAR production that means Greater Carpet Performance

for EXHIBITORS

with such outstanding Mohawk stars as

1* Wool Blend
2 Pitch**
3* Rows per inch**
4** Yarn Size**
5*** Pile Height**

assuring theater operators the decided advantages of Mohawk's exclusive *Balanced Construction Methods* for *Longer Wear!*

And . . .

TALK ABOUT TECHNICOLOR

Here it is in pile-high, luxurious beauty presented only as Mohawk designers and master-craftsmen know how to present it!

You'll be proud to show this big time carpet Hit of the Season!

Your patrons will enjoy seeing its enchanting beauty . . . feeling its rich softness underfoot!

AND YOU'LL BE TALKING FOR YEARS ABOUT THIS SOUND MOHAWK INVESTMENT YOU'VE MADE

Although Carpets are still limited we suggest you contact your MOHAWK CONTRACT DEALER. Join the ever-growing list of leading theater operators throughout the country who are choosing Mohawk "TRAFFIC-TRED" carpets. Remember—the extra wear that's built into every square yard of your "TRAFFIC-TRED" . . . the dramatic color—beauty in every square foot that will stay fresh and new looking for years—are *double features* that are making "TRAFFIC-TRED" doubly attractive to theater owners. Cut out early and costly carpet replacements by putting down a Mohawk *Balanced Construction* "TRAFFIC-TRED."

National Crestwood . . .
Choice of Leading Theatre Exhibitors

National Crestwood Carpet in the Beach Theatre, Miami Beach, Fla.

National Crestwood Carpet in the College Theatre, Brookings, S. D.

DON'T COMPROMISE WITH QUALITY . .

Distributed by

NATIONAL
THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

America's No. 1 Theatre Carpet

4 REASONS WHY

1. Exclusive patterns and colors that result from consultation with leading theatre owners, architects and decorators throughout the country.
2. Patterns that are selected for both distinctiveness of color and design and practical maintenance qualities.
3. Quality that represents the best value in theatre carpet. National Crestwood is woven for us by Alexander Smith & Sons in the famous Crestwood quality. America's No. 1 Theatre carpet.
4. Careful, practical and skillful installations that carry the well-known service guarantees of National Theatre Supply Company.

National Crestwood Carpet in the Uptown Theatre, Baltimore, Md.

SPECIFY NATIONAL CRESTWOOD CARPET

Distributed by

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

LOBBY DESIGN MERCHANDISES HOTEL AS CIVIC INFORMATION CENTER

Lobby design based on a sales idea by Bigelow Carpet Counsel

Hotel occupancy is based on service. Translating this service into a lobby design where it can be seen and appreciated by the public is the idea behind this suggestion by Bigelow Carpet Counsel.

The Bigelow carpet is especially woven to withstand heavy hotel lobby traffic.

For further details and other suggestions write Bigelow Carpet Counsel.

BIGELOW-SANFORD CARPET CO., INC.

140 MADISON AVENUE, NEW YORK 16, N. Y.

THEATRE LIGHTING EQUIPMENT
DRINKING FOUNTAINS with Illuminated Mirrors

QUALITY PRODUCTS SINCE 1903
VOIGT
COMPANY
PHILADELPHIA, PA.

EXIT and DIRECTION SIGNS
AIR+LITE Combination Diffusers for Air Distribution and Lighting

No. 100

Which DRINKING FOUNTAIN *do you like?*

No. 101

No. 102

Beauty and Utility

ARE COMBINED
IN THESE COMPLETE,
PREFABRICATED,
MATCHED DESIGNS

Do you want to create atmosphere and environment that will attract more business?

Do you want to provide comfort and satisfaction to please customers . . . and to make them come again and again?

Three Useful Features

COMBINED IN ONE
ATTRACTIVE UNIT

- **Sanitary Drinking Water**
- **Decorative Mirror**
- **Modern Illumination**

Available with or without electric cooler.

Roughing-in diagrams furnished with all details, measurements, etc. for installation, plumbing and electrical connections.

Select the one you like best. . . . Include it in your building plans and specifications.

VOIGT COMPANY

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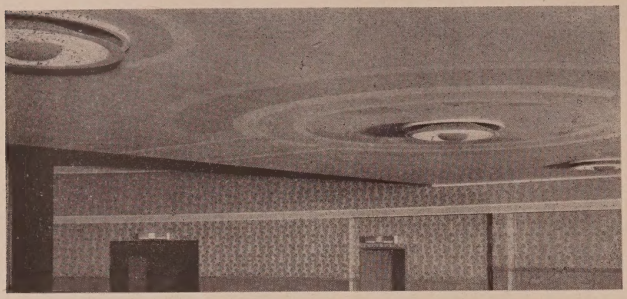
Designers-Manufacturers-Distributors

SINCE 1903 QUALITY SERVICE

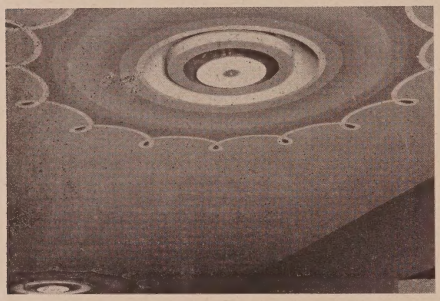
ORNAMENTAL PLASTER
1649 NORTH BROAD STREET
PHILADELPHIA 22, PA.

To facilitate inquiry re the above, please mention this volume and page number.

AIR + LITE Diffuser for Air Distribution and Illumination. Both functions combined in one unit reduces number of spots and openings in ceiling. Information on request.



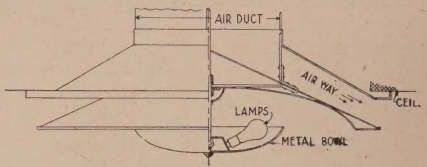
TYPE A
INDIRECT DOME
LIGHTING



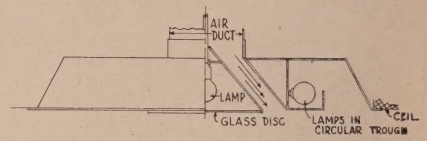
TYPE B—INDIRECT COVE LIGHTING AND GLASS

FOX THEATRE
Burlington, N. J.

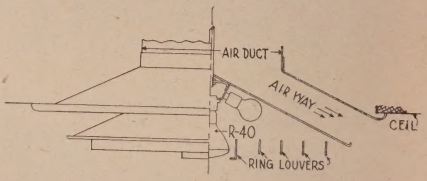
DAVID SUPOWITZ
Architect



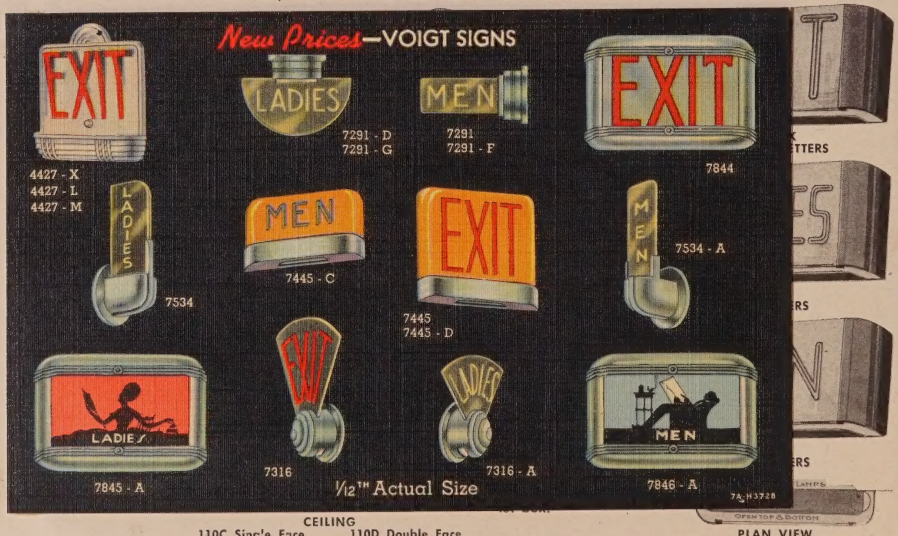
TYPE A—INDIRECT DOME



TYPE B—INDIRECT COVE AND GLASS



TYPE C—DIRECT LOUVRE

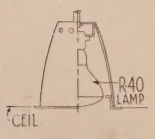


CEILING
110C Single Face 110D Double Face

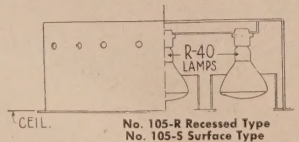
PLAN VIEW

VOIGT EXIT and DIRECTION SIGNS

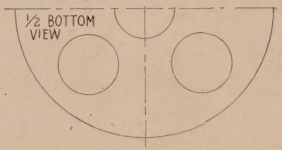
DOWNLIGHTS—For R-40 Reflector Flood Lamps. Scale: 1 inch equals 1 foot. Spacing of No. 103-R and No. 103-S should not exceed distance from ceiling to lighting level.



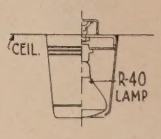
RECESSED TYPE
No. 103-R



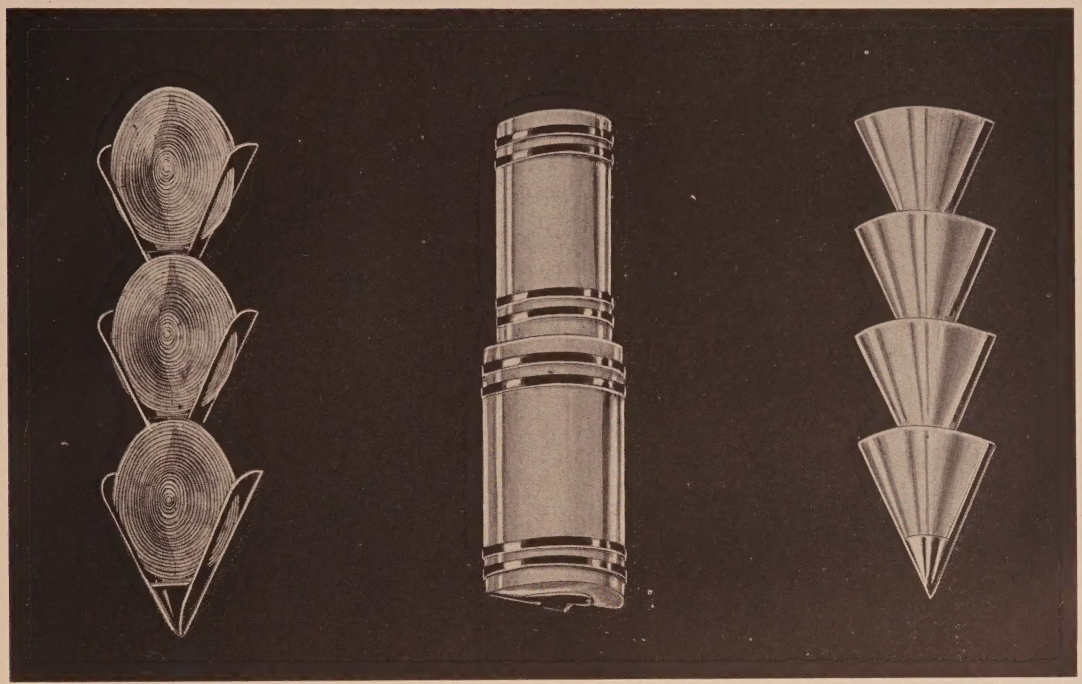
No. 105-R Recessed Type
No. 105-S Surface Type
MULTIPLE LAMP TYPE
Made in various sizes for any number of lamps



No. 105-R Recessed Type No. 105-S Surface Type



SURFACE MOUNTING
No. 103-S



No. 133—14" diameter opal glass with etched concentric lines. Three section illustrated. Made in 1, 2, 3 or more sections, 3 lights in each section. Metal parts finished in gold.

No.	Sections	Size
133	3	47x14"
132	2	33x14"
131	1	19x14"

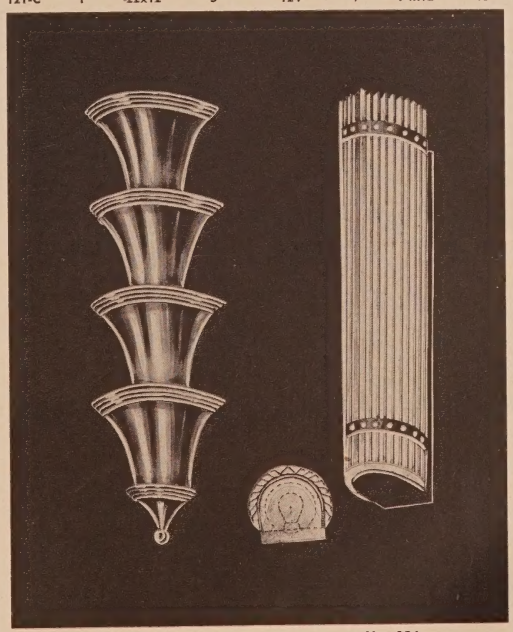
No. 122-A—Half cylinders of White Alabaster glass. Two sections illustrated. Made in 1, 2, 3 or 4 section in 6, 8, 10 and 12" diameter glass. Metal parts finished in gold.

No.	Sections	Size	Lights
121	1	16x6"	3
121-A	1	18x8"	3
121-B	1	20x10"	4
121-C	1	22x12"	5
122	2	38x10"	7
122-A	2	42x12"	9
123	3	54x10"	10
123-A	3	60x12"	12
124	4	74x12"	15

No. 144 — White Alabaster glass. 4 section illustrated. Made in 1, 2, 3, 4 or more sections; 3 lights in each section. Metal parts finished in gold.

No.	Sections	Size
144	4	40x12"
143	3	31x12"
142	2	22x12"
141	1	12x12"

The three wall brackets at top provide semi-indirect lighting thru glass. The two all metal designs provide indirect lighting. All are wired for 2 circuits providing 2 intensities of variable illumination. No. 1 circuit provides bright white or subdued amber light; No. 2 circuit, soft, restful color lighting. These are typical of many other standard designs currently available. Prices and further information on request.



No. 154 No. 104

No. 154—All metal for Indirect Lighting. 4 sections illustrated. Made in 1, 2, 3, 4 or more sections, 3 lights in each section. Aluminum finish.

No.	Sections	Size
154	4	37x12"
153	3	29x12"
152	2	21x12"
151	1	14x12"

No. 105—Metal louvred vertical fins conceal lamp bulbs yet allow a uniform glow of soft light to filter thru the openings similar to a Venetian blind effect. Top socket arranged for R-40 Reflector Flood lamp.

No.	Size	Lights
104	36x8"	13
104-A	24x8"	9
104-B	48x8"	17

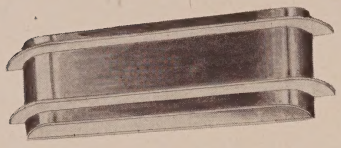
HORIZONTAL FORMS FOR MODERN STREAMLINED WALLS

Scale: 1 inch equals 1 foot

No. 106

ILLUMINATED DOORHEAD WITH EXIT ON ONE CIRCUIT FOR SHOW LIGHTING

Bent frosted ribbed glass conceals 2 - 24" Fluorescent lamps on separate circuit for house lighting. Metal parts finished in gold.



No. 109

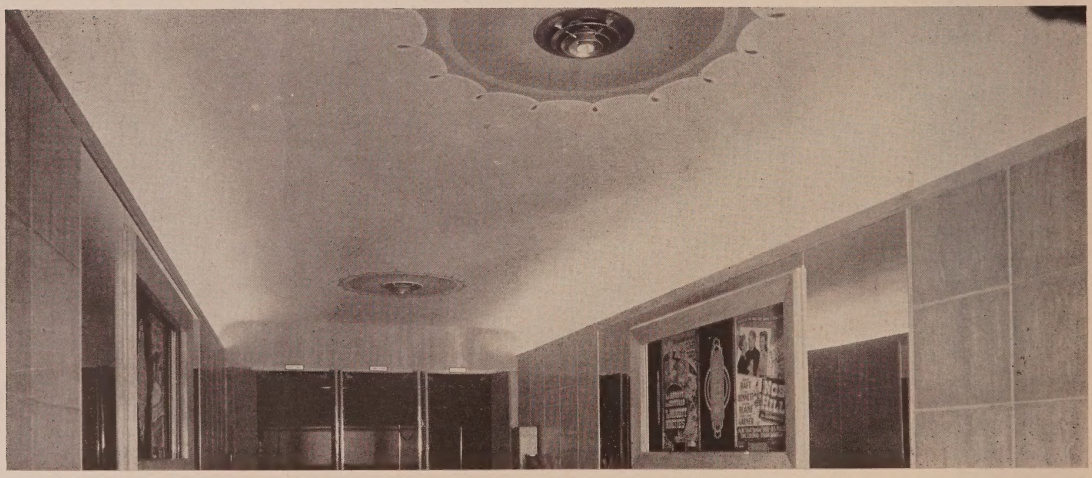
Indirect Wall Bracket with luminous glass edges. Gold finish metal.

Number	Glass size	Lights	Circuits
109	26" long	5	2 (3 x 2)
109-A	22" long	4	2 (2 x 2)
109-B	18½" long	3	2 (2 x 1)
109-C	16½" long	2	1

No. 107

Etched Aluminum decoration on bent glass.

Frosted glass panel in bottom. 3 lights 2 circuits 2 x 1. Metal parts finished in Aluminum.



Cold Cathode Fluorescent Indirect Cove Lighting—Lobby, FOX THEATRE, Burlington, N. J.

SEND BLUEPRINT PLANS and SPECIFICATIONS OR A LIST OF YOUR NEEDS. WE WILL SUBMIT SKETCH SUGGESTIONS, RECOMMENDATIONS and PRICES. WE SOLICIT YOUR REQUIREMENTS ON ALL FORMS OF LIGHTING

VOIGT COMPANY
Theatre Lighting Specialists

43rd Year

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RAMBUSCH DOWNLITE

Reg. U. S. Pat. Off. Reg. U. S. Pat. Off.

WALK-OVER SHOE STORE
548 Fifth Avenue, New York City
Eugene & Lee Schoen, Architects

The ideal unit for down-lighting in public buildings and all lofty interiors. The direct light is controlled while the spill light is completely trapped by baffle plates. High efficiency. Standard lamps used exclusively (no spotlight lamps). Minimum cleaning and relamping costs. Heat dissipation through ventilation. White reflector for utility lighting, gold-plated reflectors for decorative lighting. Approved by Fire Underwriters. U.S. Patents 2,094,670 and 2,179,161. Other patents pending. Write for further details and our new folder. Send information about your problems to our Engineering Department. No obligation.

RIVERSIDE CHURCH
New York City
Allen, Collens & Willis, Architects

SILVER SPRING THEATRE
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John Eberson, Architect

FULTON SAVINGS BANK
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Architects

Our staff of experts are at your service with layouts and suggestions for special application of downlighting equipment.

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Designers and Manufacturers

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A list of Architects and Lighting Engineers for whom we have executed Downlite installations in various parts of the country sent free upon request.

Now in Production

THE NEW 1946

AMERICAN
Bodiform
RESTFUL CHAIRS

New features that make *Bodiform Chairs* more than ever the symbol of world leadership

THE new 1946 American Bodiform Chairs, now in production, have greater patron-appeal than any theatre chair ever made before. In addition to striking new beauty and comfort, they introduce improved hazard-proof construction, newly designed end standards, greater provisions for housekeeping economy, and insure maximum wear with smooth silent functioning of all movable parts. Every feature has been rigidly tested.

Specialized Engineering Service

The practical assistance of our *specialized seating engineers* is available without obligation to you, your architect or your engineers. It will place at your disposal the technical resourcefulness of the world's largest and best equipped seating laboratory—and enable you to take advantage of the latest developments in clear vision seating, with new chair spacing economies. Act *now* to assure prompt attention.

American Seating Company

GRAND RAPIDS, MICHIGAN

WORLD'S LEADER IN PUBLIC SEATING

Manufacturers of Theatre, Auditorium, School, Church, Transportation and Stadium Seating
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IDEAL CHAIRS

"The Aristocrat"

The Improved STREAMLINERS

Four distinctly different chair lines to meet every budget and every theatre's needs.

THE ARISTOCRAT LINE
THE ARISTOCRAT OF ALL THEATRE CHAIRS

THE MERCURY LINE
THE CHAIR THAT MADE IDEAL FAMOUS

THE CHIEF LINE
IN A CLASS BY ITSELF

THE CHALLENGER LINE
ALL THAT THE NAME IMPLIES

BUILT TO EXCEL • NOT JUST TO COMPETE

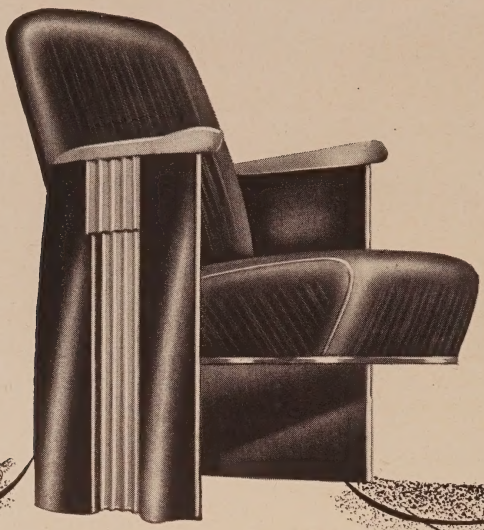
Let our planning engineers lay out your seating arrangement and insure your patrons the maximum in comfort and visibility. Planning services for theatre owners and architects without obligation.

Samples on display at all Ideal dealers. There is one near you.

IDEAL SEATING COMPANY · GRAND RAPIDS, MICHIGAN

EXPORT OFFICE: 330 West 42nd Street, N. Y. C., Attn: J. E. ROBIN

The World's Finest Theater Chair



The Only Theater Chair That Combines

LOUNGE-CHAIR COMFORT *with* PUSH-BACK CONVENIENCES

Here's the normal, comfortable, lounge-chair position of the Push-Back Theater Seat. Then, when a patron enters or leaves—

Seated patrons are not disturbed—a gentle movement of the body slides the seat back providing adequate passing space.

Relax, and the chair slides back to its normal comfortable position. There's been no standing up, no interrupted vision, and no inconvenience.

SINCE the introduction of the amazing, new Kroehler Push-Back Theater Seat, no theater can be truly modern without it! This revolutionary seating improvement eliminates standing to let others pass, affords constant screen visibility with luxurious lounge-chair comfort.

Authentic surveys prove it's a real box-office attraction. Let our consulting engineers explain how easily you can modernize your theaters with the new Kroehler Push-Back Theater Seat.

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KROEHLER *Push-Back* **SEATS**

For the World's Finest Theaters

RCA **THEATRE EQUIPMENT**

Everything for the Theatre!

INTERNATIONAL CHAIRS

America's Outstanding Theatre Seating

Comfort
Durability
Interchangeability of parts

Fashioned into

The Most Beautiful Chair ever presented for Theatres

FEATURING:

. . . for Comfort

Even distribution of weight
Perfect posture pitch
Streamline seat hull
Glove-tight upholstery
No exposed bolts or screws

. . . for Durability

Solid steel construction throughout
Hingeless seat suspension
Exclusive upholstering assembly
Superior seat spring construction

. . . for Parts Interchangeability

Easily removable seat cushion
Unit assembly

. . . for Beauty

Modern trim styling
Selected coverings
Choice patterns for end standards

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

Beautiful STAGE LIGHTING

Say 9279 Guests Every Night!*

IN ST. LOUIS, home of the world famous Municipal Theatre, 9279* guests are thrilled nightly, during the summer, with beautiful costumes and elaborate stage settings made glamorous with colorful and exquisite lighting.

When we were asked to design this Lighting and Control System, it was necessary to "build out of income," or provide for additions to the system as the new enterprise grew.

This was done. Each year new lighting controls were added or increased in capacity — until today it stands as one of the finest lighting control systems in the country.

Specializing in stage and auditorium Lighting Control Equipment for more than a quarter of a century, the Frank Adam Electric Company has designed and built stage switchboards for more than 500 large and small theatres. We would welcome your inquiry as to how we may serve you.

The following Stage and Auditorium Lighting Control Equipment can be supplied on the "Unit-Basis." Present needs can be ordered now and additional units added when required.

SWITCHBOARDS

Manual Control
Modified Pre-set Remote Control
Multiple Pre-set Remote Control
Electronic Tube Control
Mobile Color Lighting Control

DIMMER EQUIPMENT

Resistor Dimmers
Auto-Transformer Type
Reactor Type

★

Also manufacturers of Light and Power Distribution Panelboards, Switchboards, Service Equipment, Enclosed Safety Switches and Busduct.

EST. 1891 — THE SIGN OF A BETTER JOB

Frank Adam LIGHTING CONTROLS

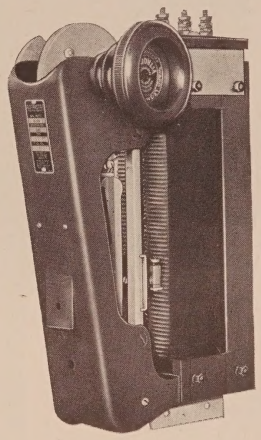
FRANK ADAM ELECTRIC CO. ST. LOUIS, MO. U.S.A.

REPRESENTATIVES IN 28 PRINCIPAL CITIES

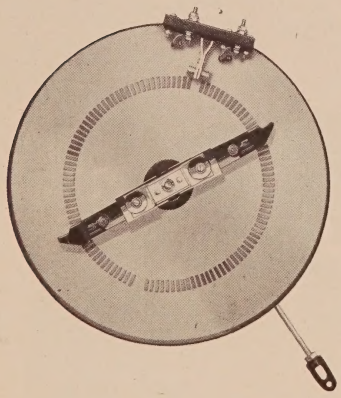
**Actual Average Attendance — 1945 Season.*

LIGHTING CONTROLS

REACTANCE DIMMERS—The Hysterset "*Electronic*" Dimmer System of Theatre Lighting Control provides the most modern type of dimming equipment for the Theatre of today. Miniature control devices permit the use of small pilot control switchboards, either desk, console, or panel type. Hysterset units with Reactance Type Dimmers provide smooth stepless dimming with no moving parts. Only one, long life, gaseous conduction rectifying tube is required for each circuit.



AUTO TRANSFORMER DIMMERS—High Efficiency Autrostat (Auto Transformer) Dimmers are manufactured for manually operated Dimmer Banks and Theatre Switchboards. Autrostat Dimmers are assembled in various forms of construction adaptable to the requirements of the installation. Interlocking operating handles provide color master, grand master, or slow motion wheel control. Autrostat Dimmers operate at high efficiency and have a range of control limited only to the maximum capacity of the Unit. Available for 120 Volt 50/60 cycle service only.



RESISTANCE TYPE DIMMERS—Vitrohm Resistance Type Dimmers have proved their value for over 50 years of use in Theatres throughout the world. The 110 step dimmer plate provides smooth flickerless dimming and can be assembled in a wide variety of framework with interlocking operating handles, master levers, and slow motion wheels to meet the most exacting specification. Self-lubricating bearings and long wearing self-lubricating contacts, reduce maintenance to a minimum and contribute to ease of operation. The lightweight pressed steel construction reduces transportation and installation costs.

For further information write to the home office.
Send for the following Bulletins:

VITROHM NON-INTERLOCKING DIMMERS	Bulletin No. 71
VITROHM INTERLOCKING DIMMERS	Bulletin No. 72
HYSTERSET DIMMING EQUIPMENT	Bulletin No. 74
AUTROSTAT DIMMERS	Bulletin No. 76
MOBILE COLOR LIGHTING EQUIPMENT	Bulletin No. 78

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Electric control devices *since 1892*

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WM. WURDACK ELECTRIC MFG. CO.

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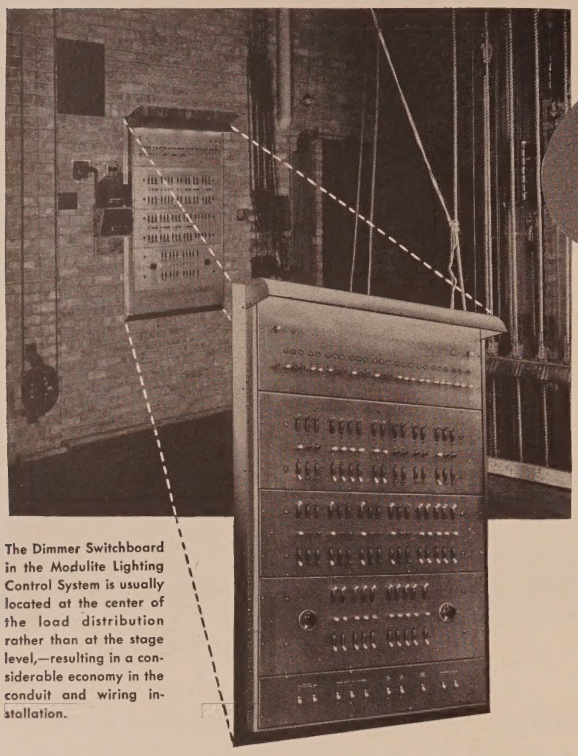


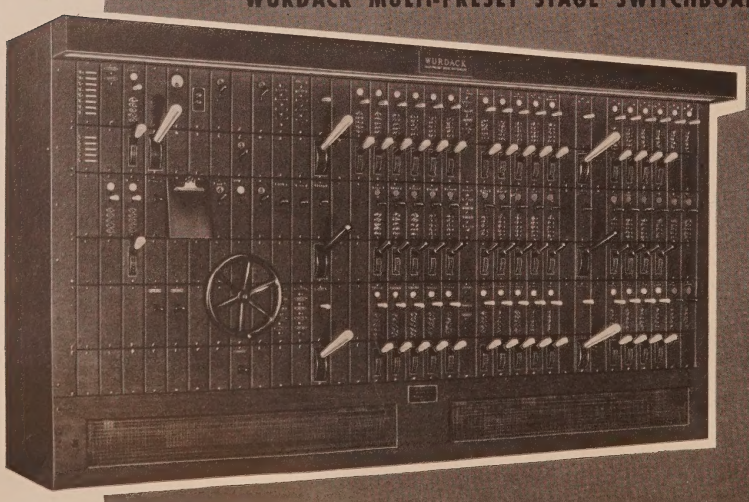
The Dimmer Switchboard in the Modulite Lighting Control System is usually located at the center of the load distribution rather than at the stage level,—resulting in a considerable economy in the conduit and wiring installation.

WURDACK MAJOR MODULITE LIGHTING CONTROL SYSTEM

for THEATRES
AUDITORIUMS
RADIO PRODUCTION CENTERS
SCHOOLS—COLLEGES
THEATRE—RESTAURANTS
LODGE BUILDINGS

The Modulite Lighting Control Pilot Switchboard appearing in the illustration has 43 4000-watt Dimmer Controls in 2 presets and 24 Individual Contactor Controls with Master Blackout coupled with a number of unique features including Dual Fader control, two simultaneous Dimming speeds and Remote Fader Mastering. Due to the compactness of the design of the Pilot Switchboard a minimum of wall space is required.

WURDACK MULTI-PRESET STAGE SWITCHBOARD



A typical Wurdack Multi-Master Pre-Set Pilot and Dimmer Switchboard which is usually located at the stage level with the Remote Control Switchboard located elsewhere in a fire-proof and sound-proof room.

This switchboard has provision for 48 individual sections each with Theatre Switch, Indicating Bull's Eye, Five preset switches and dimmers ranging in capacity from 2000 watts to 24,000 watts. Also Color Master sections, Stage Master, Pocket Master, House Master and All Master Preset switch control sections with Slow Motion Grand Master for the Dimmers.

AUTOMATIC DEVICES COMPANY

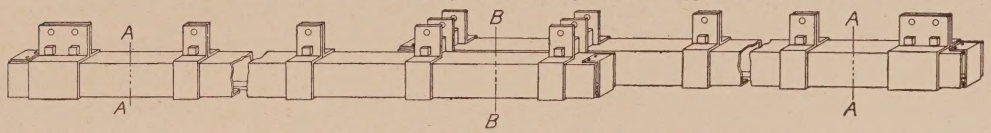
1039 LINDEN STREET, ALLENTOWN, PA.

PRODUCTS

"SILENT-STEEL" Heavy Duty Curtain Track.
"BESTEEL" Medium Duty Curtain Track.
"FENESTEEL" Window Curtain Track.
"AERIAL" Type Unit-Combination Track and Machine: ⅓ hp.
"SILVER SERVICE" High Speed Curtain Machine: ½ hp.
"AUTODRAPE" Standard Curtain Machine: ⅓ hp.
"AUTODRAPE" Special Curtain Machine: ¼ hp.
"STABILARC" Motor-Generator for Projection Arc Supply.

CURTAIN TRACKS

Turnbuckles, Pipe-Batten Hangers, Wall or Ceiling Brackets Supplied as Desired

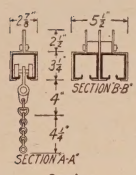


To Determine Gross Length of Track Required—As a basis, start with the clear width of opening which curtain is to uncover; i.e., distance between inside edges of curtain halves when in open position. Add 10% for lap at center for curtain when closed. Add 10% for extension on each end to accommodate each half of curtain when in open position. Total addition is 30%.

Example: Open curtain is to expose 30 ft. clear width. Add total of 30% or 9 ft. for center lap and both end extensions. Specify 39 ft. gross length, in two sections each 19 ft. 6 in.

"SILENT-STEEL" HEAVY DUTY CURTAIN TRACKS

For Any Length—with Curtain of Any Weight



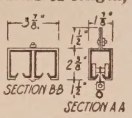
Section Dimensions

Suggested Specifications—Curtain tracks shall be of full-steel construction, 14-gauge, entirely enclosed, except for slot in bottom, each half to be one continuous piece and free of any riveted, welded or other mechanical joints regardless of length, except at center lap. Each curtain carrier shall be supported on ball bearings by two special composition rubber wheels rolling on two separate parallel treads, and all pulley blocks equipped with steel ball bearing wheels adequately guarded; Model No. 280 as manufactured by AUTOMATIC DEVICES COMPANY of Allentown, Pa.

"BESTEEL" MEDIUM DUTY CURTAIN TRACKS

For Lengths up to 36 Ft.—with Light or Medium Weight Curtain

Suggested Specifications—Curtain tracks shall be of full-steel construction, 14-gauge, entirely enclosed, except for slot in bottom, each half to be one continuous piece and free of any riveted, welded or other mechanical joints regardless of length, except at center lap. Each curtain carrier shall be of cadmium-plated steel construction supported on self-lubricating bearings by two special composition rubber wheels rolling on two separate parallel treads, and all pulley blocks equipped with steel, ball-bearing wheels adequately guarded; Model No. 170 as manufactured by AUTOMATIC DEVICES COMPANY of Allentown, Pa.



Section Dimensions

Track Samples Gladly Supplied Upon Request

AUTOMATIC CURTAIN MACHINES

"Autodrape" Curtain Machines

All "Autodrape" machines are equipped with exactly the same gear reduction unit, base and automatic reversing switch mechanism, including the following features:

(1) Limit Switch Arrangement—Adjustment for "open" and "close" positions reduced to simplest form.

(2) Elevator Type Traction Drive—Maximum delivered power without slippage.

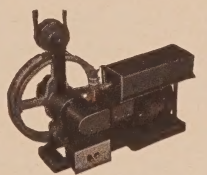
(3) Mounting—Endless cable design allows installation of machine at any position in vertical plane of track.

(4) Disconnecting Clutch—For conversion to hand operation.

(5) Automatic Overload Protective Breaker—Protects machine against excessive loads.

(6) Motor—¼ or ⅓ hp., single phase.

(7) Speed—92 or 115 ft. per minute, equivalent to curtain separation of 2¾ or 3½ ft. per second, respectively (based on 60-cycle current).



"Autodrape" Standard Model
Over-all dimensions: 19½ in. long, 10 in. wide, 15½ in. high

"Autodrape" Special Models—These models have features listed at left and are the lowest priced fully automatic machines on the market; ¼ hp.

Recommended for use with "Silent Steel" or "Besteel Tracks up to about 36 ft. gross length.

"Autodrape" Standard Models—In addition to the features listed at left these models include idler system and finger-tip control switch attached to machine; ⅓ hp.

Recommended for use with "Silent-Steel" Curtain Tracks up to about 50 ft. gross length.

"Silver Service" Curtain Machine

This model has all the features of the "Auto-drape" Standard Machine. It is equipped with ½-hp. motor delivering a cable speed of 125 or 155 ft. per minute equivalent to curtain separation of 4 or 5 ft. per second.

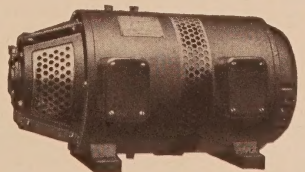
Recommended for use with "Silent Steel" tracks up to about 80 ft. gross length.

STABILARC MOTOR-GENERATORS

Designed and built to deliver constant voltage for every type of projection arc.

OUTSTANDING FEATURES

- Interpole construction assures sparkless commutation.
- Rotating assembly automatically and accurately balanced at full speed before shipment thus practically eliminating vibration and noise.
- Oversize ball-bearings guarantee highest operating efficiency and long life.
- Removable covers over all openings allow maximum accessibility with complete safety.
- Windings are double insulated by vacuum process to remove all traces of moisture and other trouble-producing causes.
- Extremely small voltage variation regardless of amperes delivered.



NO STARTER REQUIRED

Motor Generators up to and including the 150-300 ampere—30 H.P. size can be started across full line voltage without compensator or resistance and without exceeding the current limitations prescribed by Power Companies, Insurance Underwriters and Municipal Authorities everywhere, which means—

A saving up to 20% in First Cost

PIONEER MANUFACTURER OF IMPROVED NOISELESS CONTROLS

OFFERS STAGE CURTAIN EQUIPMENT

TO MAKE "GOOD THEATER" FOR EVERY THEATER!

NO STAGE TOO LARGE - OR TOO SMALL!

The quickest . . . safest . . . most economical way to solve your curtain control and track problems is to standardize on Vallen.

Since 1915, architects and builders of fine theaters have relied upon the integrity and ability of the Vallen Company to furnish controls and tracks that will operate curtains smoothly and quietly.

Experienced Vallen engineers will be glad to share your problems with you . . . to give you the benefit of knowledge gained in thousands of successful curtain control and track installations in every section of the world. Vallen is the originator, the pioneer, the exclusive manufacturer of precision track and curtain control units . . .

NOW! A CURTAIN TRACK THAT MOVES DRAPERIES AROUND CORNERS!

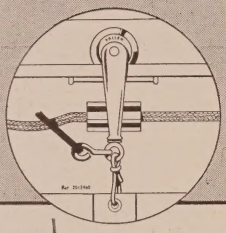
LIKE THIS!

SMOOTH, QUIET ACTION

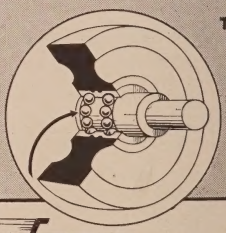
Vallen "Round-the-Corner" Track makes possible the installation of curtains in many locations where space prohibits the use of standard curtain equipment. With this "2 in 1" track, it is possible to provide a fresh scene by push button control! What *was* front curtain becomes back. Simple, quick, unfailing. Another advance in stagecraft.

VALLEN NOISELESS REAR-FOLD TRACK

Vallen Rear-Fold Attachment.

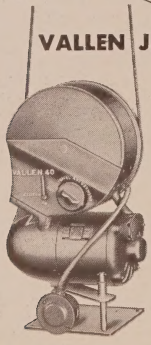


This is one of the most important stage equipment inventions ever made. Curtains move back as one smooth, ungathered surface . . . attractive designs and scenic effects are unmarred by folds . . . titles stay clear and free from distortion. All curtain folding takes place at extreme ends—out of spectators' view. Curtains operate with greater ease and smoothness than on any other type of track. Years are added to curtain life.



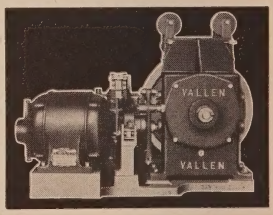
Two rolls of ball bearings in wheel hub assure smooth, noiseless action. No lubrication required.

VALLEN JUNIOR CONTROL No. 40



One of the most popular models in Vallen's curtain control line is the No. 40 Junior. This is the most compact curtain control ever built — faster, safer and lower priced . . . built for long life and continuous service. Val Switch and One Button Control assures instantaneous curtain action . . . stopping at any desired point . . . reversal . . . perfect timing. Thermo Protector permits safe "leaving on" of current for indefinite period with motor in locked position. Exclusive Vallen floating control eliminates cable slippage.

AERO-SPEED CONTROL —Select Speeds!



Here is today's best answer to your most complicated control problem. Aero-Speed operates curtains at any selected speed between 40 and 228 ft. per minute. Curtains are operated by remote control from a conveniently-located electric push button station. Press the button and curtains move; press it again—they stop instantly . . . no coasting. Press the button the third time, and they reverse. Specify Vallen Aero-Speed for your theater and assure yourself of years of satisfactory, trouble-free operation.

Originators and Exclusive Manufacturers of

Noiseless Curtain Track, Control Equipment, Special Operating Devices

Vallen, inc. AKRON, OHIO

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J.R. CLANCY INC. SYRACUSE, N.Y. MADE IN U.S.A.

Complete Line of

STAGE RIGGING AND SCENERY HARDWARE

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TYPICAL SMALL STAGE *by Clancy*—CENTER THEATRE, PASSAIC, N. J.

EVERY STAGE SHOULD HAVE

. . . an Individual Plan

Today a stage that is *not* planned and proven before it is erected is soon likely to be in the horse and buggy class. To be successful in modern competition it must be *individually planned.*

The completeness and flexibility of the large stages, with their huge proscenium openings, and with every detail carefully *planned* and *proven* before erection, are among the wonders of our age. It is even more important to plan the small stage in advance than the large one because space, proscenium and other features are so limited.

J. R. Clancy, Inc., offers a complete **Stage Planning Service** for any stage from the smallest to the largest, with estimated costs. Sixty years of experience in designing, manufacturing and constructing stages of all types and sizes adds immeasurably to the value of our counsel.

When you employ Clancy you enjoy the advantage of one contract, one contractor, one complete service, and a guarantee covering our entire operations. J. R. Clancy is the only organization furnishing such a guarantee. Consult Clancy if you plan to . . .

- *BUILD A NEW THEATRE*
- *ADD A STAGE TO A MOVIE HOUSE*
- *REMODEL A STAGE*
- *INSTALL NEW EQUIPMENT*

World's Largest Designers, Manufacturers and Riggers of Stage Equipment

NO STAGE TOO SMALL OR TOO LARGE

J. R. CLANCY, Inc.
1000 W. BELDEN AVE.
SYRACUSE 4, NEW YORK

ALL CLANCY EQUIPMENT MEETS FIRE REGULATIONS

ONE Contract • ONE Contractor • ONE Complete Service • Saves Time, Money

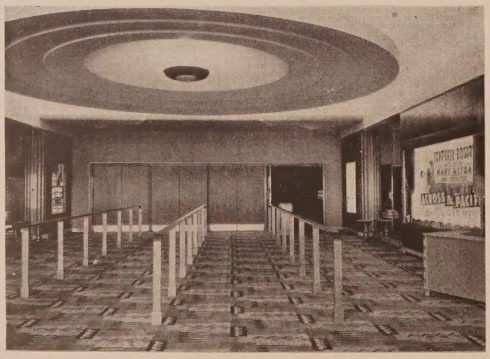
Typical modern screen theatre fully equipped from entrance to stage with Kliegl lighting, utilizing the latest developments in illumination for the creation of a delightful environment.

KLIEGL
for Modernization

IT PAYS to install the latest Kliegl lighting equipment when building new theatres or remodeling existing structures. Improved designs and unique features secure decided advantages. Obsolete equipment lowers efficiency of operations and favors competition. Box office returns justify the use of Kliegl modern lighting methods and equipment.

Plans.

THOUGHTFUL planning for modern and effective illumination is the beginning of a good installation. Progressive ideas and suitable equipment can more readily be incorporated in the structure when building plans and specifications are being prepared. The suggestions and assistance of our engineering staff will be helpful to you in the selection and layout of equipment designed to accomplish the particular results desired. Fifty years experience in the handling of lighting problems assures a practical approach and satisfactory solution of your difficulties. Confer with our engineers when the project is in the planning stage.



Lobby lighting by Kliegl. Indirect fluorescent system used for general illumination, accented with occasional incandescent units and supplemented with brightly lighted display frames.

DOWNLIGHTS

For general lighting of auditoriums and spacious rooms with high ceilings. Fixed and adjustable beam types, for concealment above ceiling, projecting their light through a small aperature. Also angular types for front lighting of stage.

FLUSH FIXTURES

Inbuilt units or strips for direct illumination or decorative applications. Various designs and sizes in Fresnel lens type ceiling fixtures and fluorescent or incandescent extended fixtures of desired arrangements.

COVE STRIPS

Continuous channel or reflector strips for installation in coves and other structural recesses to provide indirect illumination. Incandescent or fluorescent types in various designs for different requirements. Made in any length or curvature.

POSTER LIGHTS

For attractive illumination of display frames or similar theatre announcements. Standard or special fluorescent strips and other forms of lighting supplied to suit requirements.

EXIT SIGNS

Made in conformance with fire regulations. Flush wall, surface and other types. Plain and ornamental designs with stenciled or etched lettering to harmonize with architectural style.

DIRECTIONAL SIGNS

To guide theatre patrons, indicating way to foyer, lounge, rest rooms, etcetera. Box, pedestal and suspension types with concealed illumination. Usually built to meet individual requirement, but standard designs are also available.

WALK LIGHTS

Enable patrons to safely find their way about in darkened auditoriums. Cast subdued light downward on steps and aisleways. Various types available—for end-seat mounting, for stair risers, and for side walls.

FLOODLIGHTS

Exterior, interior and stage types can be furnished—for lighting the building front, lobby displays, or stage productions. All standard sizes and designs are available in all three types of floodlighting units.

KLIEGL BROS. UNIVERSAL ELECTRIC STAGE LIGHTING Co., Inc.

LIGHTING
of Your Theatre

FUNCTIONAL requirements properly considered in relation to the characteristics of various lighting devices govern the selection of Kliegl equipment. Intelligent application of light is the secret of good illumination and satisfactory installations. The great variety of Kliegl devices insures a solution to any lighting problem.

SPOTLIGHTS

Theatrical spotlights of all types and sizes can be furnished—either carbon arc type or for incandescent lamps; Fresnel or plano-convex lenses; for long or short range projection. Also, balcony front spots with remote control color frames; and all-duty spotlights with inbuilt accessories for stage lighting from the projection booth.

FOOTLIGHTS

Complete range of designs are made—from single-row open-trough reflector type footlight for a small stage to the double-row high wattage type with individual reflectors and color roundels used in the largest theatres. Disappearing types are also available and made in several different designs.

BORDERLIGHTS

All standard types and sizes, and special designs, can be supplied—in continuous lengths or in sections as required, with or without work lights, wired for color control in any required number of circuits.

CYCLORAMA LIGHTS

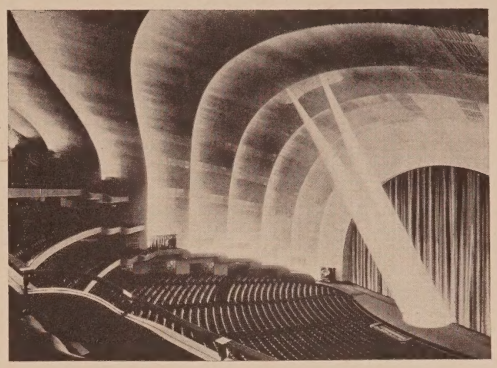
Designed to evenly light the stage backdrop from the shortest distance possible, can be furnished. Straight or curved to conform with the cyclorama. Wired for color control and constructed with light guards to insure purity of colors. Cyclorama footlights usually recessed in the stage floor but portable arrangements can also be furnished. Borders are furnished sectionalized or continuous as required.

STAR OUTLETS

Used in atmospheric theatres with overhead sky effects. Units which are furnished are set in the ceiling and produce star-like flickering lights. Cloud machines can also be supplied which create the illusion of floating clouds moving slowly across the painted sky.

PROGRAM LIGHTS

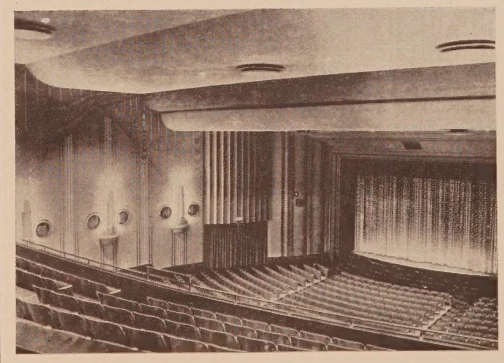
A modern convenience which enables patrons to read their programs in darkened auditoriums. Recessed in back of chair in front of patron, local light is obtained by pressing a button. Baffles shield the light from others nearby. Available in several different wiring arrangements.



Stage and auditorium lighting of Radio City Music Hall is the most elaborate system anywhere to be found. Modern in every respect it was furnished entirely by Kliegl Bros.

Queries.

INFORMATION concerning our products or services is available at any time. Simply advise us of your needs and we will respond with the latest available information, illustrated literature, technical data, price details, or other pertinencies as may be required. Inquiries regarding the application of Kliegl devices and the production of lighting or stage effects will receive our thoughtful attention. Facts on available supplies furnished promptly. Your questions are cordially invited and our answers will be definite and helpful.



Downlighting of this auditorium is accomplished with Kliegl units concealed above ceiling, providing unobtrusive uniform illumination throughout with comfortable viewing of the screen.

321 WEST FIFTIETH STREET, NEW YORK 19, N. Y.

Von Duprin

TRADE MARK

SELF-RELEASING FIRE AND PANIC EXIT DEVICES

The purpose of these devices is to provide safe exit for the occupants of a building—at all times, day or night, and regardless of whether the exit doors are locked against entrance from the outside.

This is accomplished by means of a cross bar, pivoted at either end, which, when pushed down or pulled up, releases the latch bolt. In most models, the door may be left freely operable from the outside, or locked against entrance except by key.

Von Duprin devices were the first to be invented and manufactured, and are the largest selling line of fire and panic exit devices in the world. They have been sold continuously since 1908 by the Vonnegut Hardware Co., a hardware house founded in 1852.

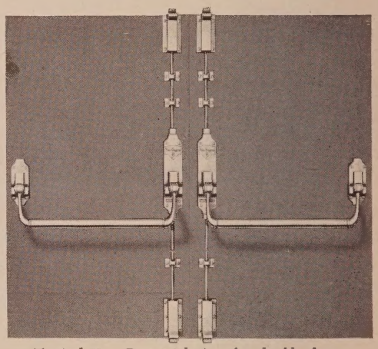
In brief, Von Duprin devices provide the occupants of the building with safe, sure, instant exit at all times—and to the theatre executive they bring the solid satisfaction of knowing that both patrons and staff have been given the best possible protection in case of fire or panic.

THE IMPORTANT FACTS

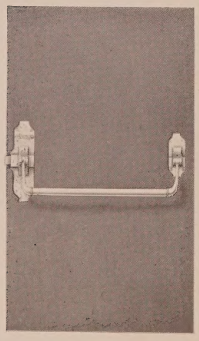
THEATRE APPLICATION. Fire and panic exit devices should be used on every exit, fire stair, and fire escape door of the theatre.

TYPES. Von Duprin devices are made in a wide variety of types for various purposes, most of them falling into two classes, those for single doors and those for double doors, the device for the standing door of the latter being equipped with vertical rods carrying latch releases at the top and bottom of the door.

QUALITY AND FINISH. Von Duprin devices are made in drop-forged brass or bronze, in cast brass or bronze, and in malleable iron. In most models the important functioning members are of drop-forged brass or bearing metals. Any standard hardware finish is available.



Typical Von Duprin devices for double doors.



A typical Von Duprin device for a single door.

DOOR DESIGN. Von Duprin devices are made for application to nearly every kind of wood and metal door, and no special door design is necessary except that doors must open *outward*.

APPLICATION AND MAINTENANCE. Von Duprin devices are easily and quickly applied by any capable carpenter. Complete instructions and templates are supplied with each device. They require little or no maintenance except a few drops of oil when needed. On the rare occasions when parts may be necessary, these can be secured from the builders' hardware dealer or direct from the home office.

ADVANTAGES. Most Von Duprin devices may be operated by either a push or a pull on the cross bar, a very important factor in case of panic. Because of their simplicity of design and exceedingly strong parts, Von Duprin devices are easily operated, yet have the great strength necessary to withstand the severe demands of a panic or other emergency.

AVAILABILITY. Von Duprin devices may be bought through any builders' hardware house. In addition, representatives over the country are prepared to provide service and professional advice on the most desirable types for any purpose. Your request to the home office will promptly put the nearest representative in touch with you.

VON DUPRIN DIVISION
VONNEGUT HARDWARE CO.
402 WEST MARYLAND STREET, INDIANAPOLIS 9, INDIANA

SECTION 2-C

LOUNGE *and* TOILET ROOMS

1945

Tomorrow's Toilets — for Today's Theatres

New Design and Installation of Plumbing Do Not Forget Children Are Patrons, Too

The wheels of progress continue to turn in the plumbing industry just as they do in other industries. At American Standard, as throughout the industry, we will be turning out fine products in greater quantities to serve the nation's health and comfort. It is such progress—a constant striving to do better than has been done before, to produce better products than have ever been produced—that makes our standard of living the highest in the world.

Constant advancement is being made in the building industry, too, where new materials and new methods of construction developed during the war may be used—if, after being subjected to further careful research and rigorous testing, they prove practical for peacetime construction use.

In the past, plumbing fixtures and brass fittings have kept pace with the progress made in the building industry. In fact, they have contributed greatly to its advancement, leading the way toward increased sanitation and resulting better health in homes, public and semi-public buildings. The plumbing industry will continue to advance in the future, side by side with the building industry, continually testing, changing, bettering the products it manufactures.

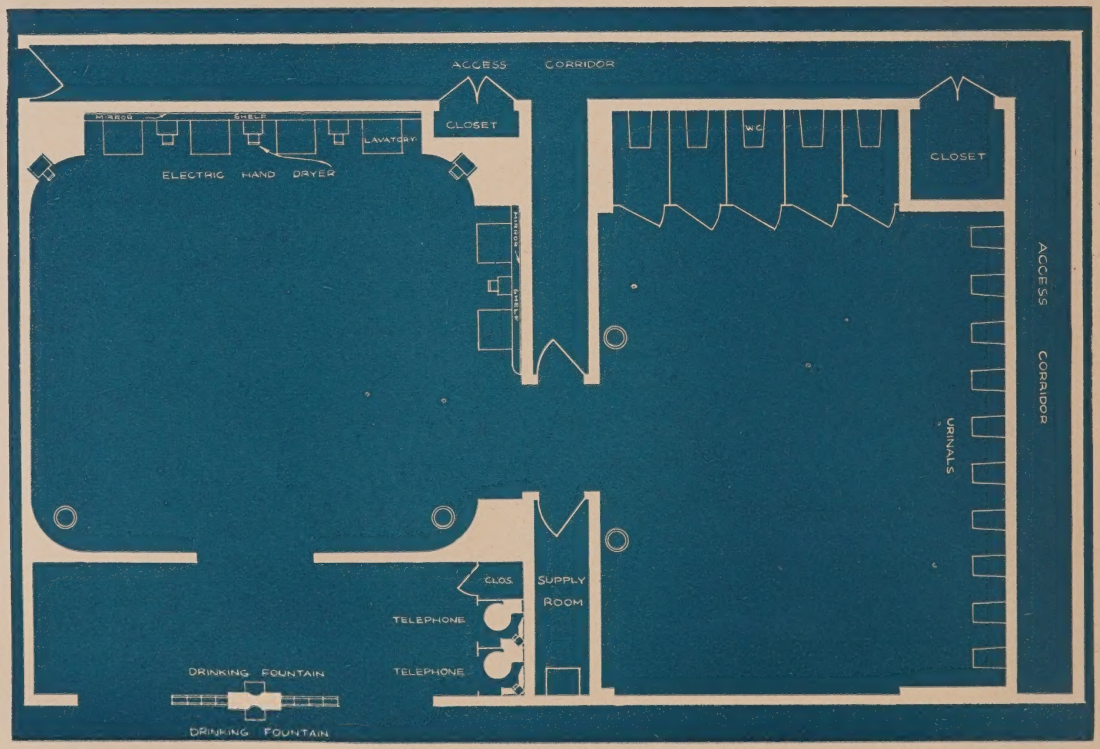
But the changes of tomorrow will be developments of evolution, rather than revolution, in design and function. High practicability is the order of the day, and there will be no experimentation at the expense of the public. The basic functions of plumbing fixtures remain the same. Changes will be made whenever they mean greater efficiency or economy, increased sanitation, added convenience, or more striking appearance in the fixtures. Also, changes will be made to provide the most satisfactory fixtures possible to meet specifications resulting from new designs, construction methods, or materials used by the building industry. Just as before, changes in plumbing fixtures will come as the natural result of needs, actual or anticipated, of the public we serve.

MODERN TOILET ROOMS

Theatre toilet rooms of today reflect the strides which have been made already in design, construction, utility, and appearance. Vitreous china and chromium plating have offered much toward complete sanitation, and have made it easier to keep washrooms clean. Improved design has added greatly to the utility, as well as to the appearance of fixtures. Color, too, has been introduced for good looks. All these advancements have led to increased sanitation and comfort for patrons using public and semi-public toilets.

Illustrated are floor plans of two toilet rooms executed by our Bureau of Design as examples of ideal washrooms for

PLAN OF THE MODERN MEN'S ROOM is indeed spacious, not only for the theatre patron, but for the theatre employe as well. In layout, the plan is ideal, and, with the use of modern plumbing fixtures (also herein described), including electric hand driers, it lends itself to being kept immaculate with the least amount of work. Access corridors of ample proportions give plenty of space in the event repairs are needed. These plans, including that of the ladies' room, have been especially prepared for the THEATRE CATALOG by the American Radiator and Standard Sanitary Corporation, which also furnished the Standard pictures.



theatres. These toilet rooms are the most modern and efficient possible. They are washrooms of tomorrow—today!

CARE IN PLANNING IMPORTANT

The type and number of fixtures and their position in the toilet rooms are naturally the most important parts in the planning of theatre toilet rooms. However, there are many other details, very nearly as important, to be considered carefully if toilet rooms are to combine these four necessary features—cleanliness, convenience, efficiency, and attractive appearance.

First of all, theatre toilet rooms should be in a convenient location. In larger theatres, toilet rooms may be placed at either end of a lounge, with vestibules between each room and the lounge.

Drinking fountains, built-in near entrances to toilet rooms, are added conveniences. The drinking fountain should be completely sanitary, being constructed of non-absorbent genuine vitreous china. In white or color it should be a beautiful decorative addition to the theatre. Subdued lighting over each fountain will accentuate its beauty and assure a cleaner fixture at all times.

Toilet rooms should be of ample size to provide utmost cleanliness and convenience. For the convenience of your patrons, it is important that these rooms be large enough to prevent overcrowding and resulting unsanitary conditions. Proper lighting and ventilation are necessary, too, for pleasant, hygienic toilet rooms. Well-lighted washrooms, with plenty of illumination above mirrors, look brighter, cleaner. Also, a light installed in each water closet enclosure is recommended. Floors and walls should be entirely of ceramic materials, for these materials withstand wear and are easy to clean. Floor drains should be installed in every toilet room, the number of drains depending upon the size of the room. They make cleaning easier, guard against damage from excess water on floors.

Double outer doors will permit easy flow of traffic to and from toilet rooms. For greater sanitation, doors opened automatically by an "electric eye" are recommended. This device makes it possible to open the door without actually touching it.

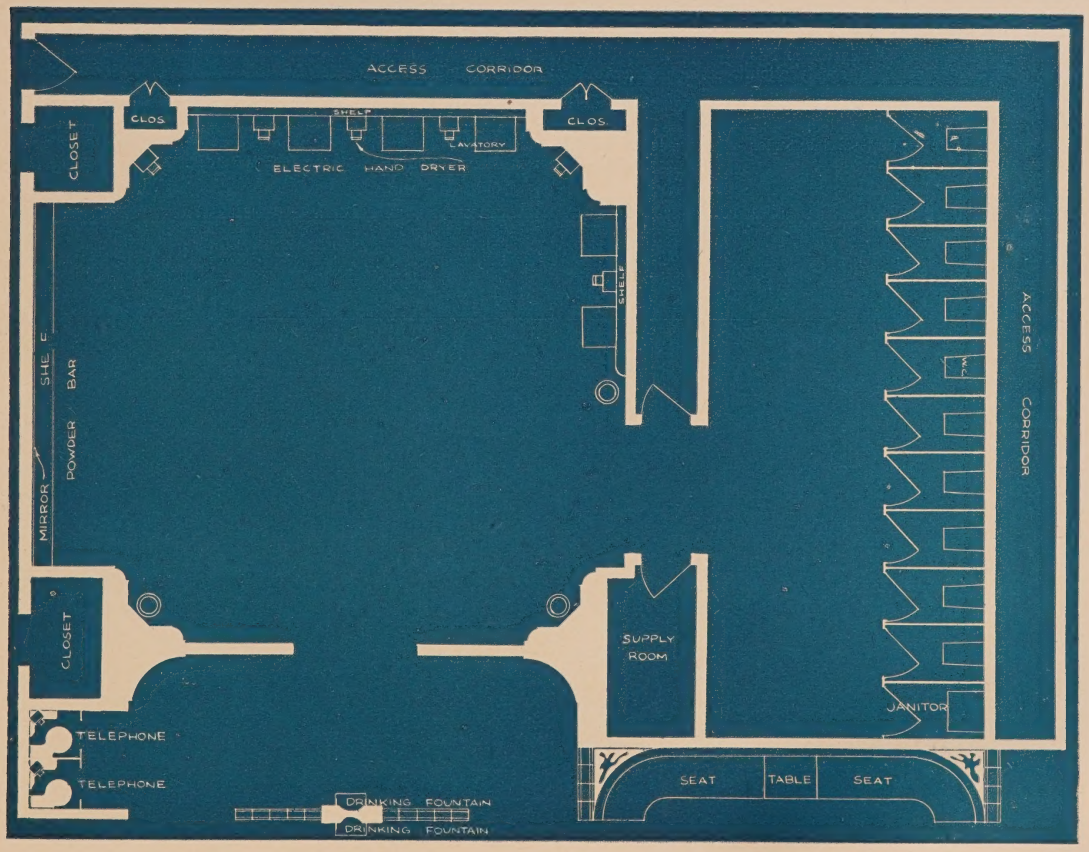
A problem worthy of careful consideration in planning theatre toilet rooms is that of providing a sufficient number of fixtures. The number naturally will vary with the size of the theatre, but it should not be estimated too low. Plenty of lavatories, water closets, and urinals will assure complete convenience and efficiency in toilet rooms, and will make them more pleasant and more sanitary.

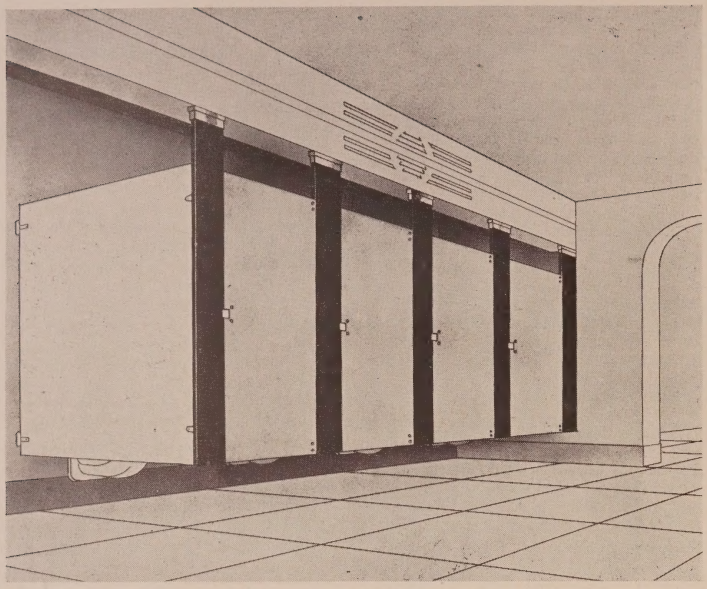
Wherever construction permits, all plumbing fixtures should be of the wall-hanging design, supported on concealed chair-carrier supports. This type of installation eliminates exposed pedestals and legs, and permits cleaning of the entire floor without obstructing supporting members. Cleaning is easier, and there are no cracks or corners where dirt can collect.

EASY-TO-CLEAN LAVATORIES

The Standard Buena lavatory, that was designed for utmost efficiency, is popular for use in theatre washrooms. Constructed of genuine vitreous china, its hard, glazed surface is non-absorbent, easy to clean and keep clean. Acids, medicines,

PLAN OF THE MODERN LADIES' ROOM is also designed to afford the luxury of ample room, for the attaches of the theatre no less than for the patrons themselves. Here, too, the new style fixtures are employed, with also electric hand driers to replace paper towels. While not shown in the plan, the design contemplates the installation of some toilet fixtures at a lower level for the exclusive use of children. The feature will appeal to the children, as well as to parents. Such special features should be appropriately labeled. Color is also used in the modern toilet rooms, as are vitreous china, chromium plating, and other materials.





IN THE INTEREST OF SANITATION, water closet stalls should be supported from the ceiling and not rest upon the floor at any point, as shown in this drawing. This type of enclosure, when used with wall-hanging fixtures, entirely eliminates obstruction on the toilet-room floor, with the result that cleaning is easier and more thorough. The stalls themselves should be of ample size. Sanymetal Products Company, Inc., supplied this drawing.

or cosmetics will not stain this gleaming lavatory which retains its luster and is always bright. One-piece construction means no unsanitary, dirt-catching joints. Lavatories of convenient size, preferably 24 x 20 inches, should be installed. However, where space is limited, lavatories may be 20 x 18 inches.

Tempered water—provided by a thermostatic mixing valve—is supplied to each of a row of lavatories through a central supply spout equipped with a small spray on the outlet. The water is controlled by a self-closing floor valve, so there is no need to touch water faucets when using the lavatory. The controlling valve, installed on a line to the spray outlet, regulate and determines the amount of water used. Thus the water used is kept to a minimum.

A perforated waste strainer prevents small articles such as rings or coins from clogging drains. This strainer permits washing in running water, prevents possible overflow, and eliminates the old-fashioned rubber stopper. Traps under lavatories should have an inside diameter of no less than 1½ inches, with a clean-out plug to assure efficient operation at all times.

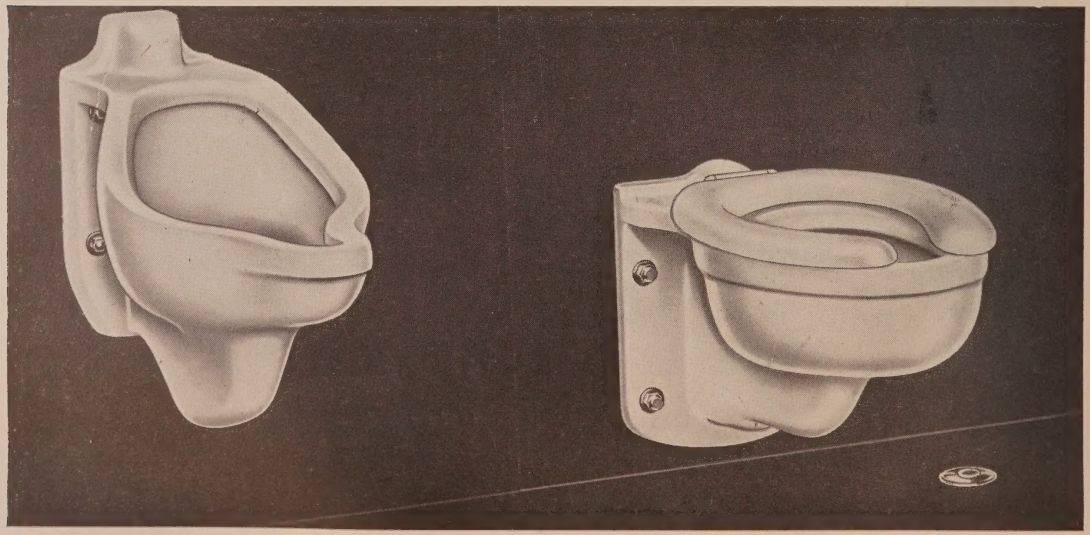
Patrons should be furnished with liquid soap dispensed through a valve mounted on each lavatory. A valve of this type prevents soap from dripping onto the lavatory, keeps lavatories cleaner. Soap is supplied through a piping arrangement concealed in the wall and connected to a reservoir with a capacity of from one to five gallons, depending upon the number of lavatories to be served. Whenever possible, the reservoir should be concealed also.

Another convenience patrons appreciate is a built-in shelf of tile or marble running the length of a battery of lavatories. Since it does not extend out from the wall, patrons cannot bump against this shelf when using the lavatories. Recessed mirrors full-length above the shelf complete the appointments.

In accordance with the elimination of manual controls wherever possible, built-in electric hand dryers operated by foot levers are sanitary and efficient. They blow warm air to dry hands quickly, and patrons need not touch them with their hands. The dryers should be located conveniently near the lavatories, as shown in the floor plans. These also eliminate the paper towel which inevitably finds its way to the floor.

A NEW TYPE OF URINAL is represented by the Standard Expello, designed to function as a water closet, having a large outlet to insure complete flushing and to eliminate many of the stoppages that occur with less capacious fixtures. For maximum sanitation, it is constructed of vitreous china and is mounted on the wall as are Glenco water closets, and the Standard Buena lavatories. The Expello is, like the Glenco, too, equipped with a foot-operated flush valve.

WATER CLOSETS, like other fixtures, should be of the wall-hanging design for easier cleaning of the toilet room. The Standard Glenco, shown at the right, is a wall closet especially suited to theatre toilet rooms. It is constructed of non-absorbent, vitreous china which makes it easy to clean. The Glenco is of the syphon jet type for the greatest possible efficiency. It is furnished with a foot-operated flush valve installed in the floor, latest in public sanitary fixtures.



MAXIMUM SANITATION

Water closets, like other fixtures, should be of the wall-hanging design for easier cleaning of the toilet room. The Standard Glenco is a wall closet especially suited to theatre toilet rooms. It is constructed of non-absorbent genuine vitreous china, an easy-to-clean, durable material that will retain its shining finish indefinitely. The bowl is of the elongated design, providing a maximum bowl opening. Also, the Glenco is of the syphon-jet type for greatest possible efficiency.

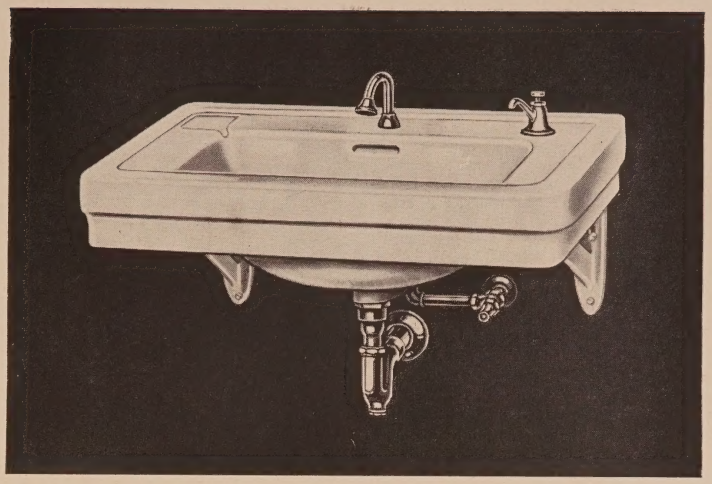
Wherever it may be possible, water closets should be furnished with foot-operated flush valves installed in the floor, as with lavatories. Foot-operated valves are the ultimate in sanitation in public and semi-public washrooms.

Closets should be furnished with open-front seats and strong hinges finished in the same material as the seat. These seats should have no joints or seams, and be covered with a thick composition plastic that is non-inflammable, indestructible, and impervious to moisture or liquids that might stain ordinary seats. Like the closets, they are easy to keep clean.

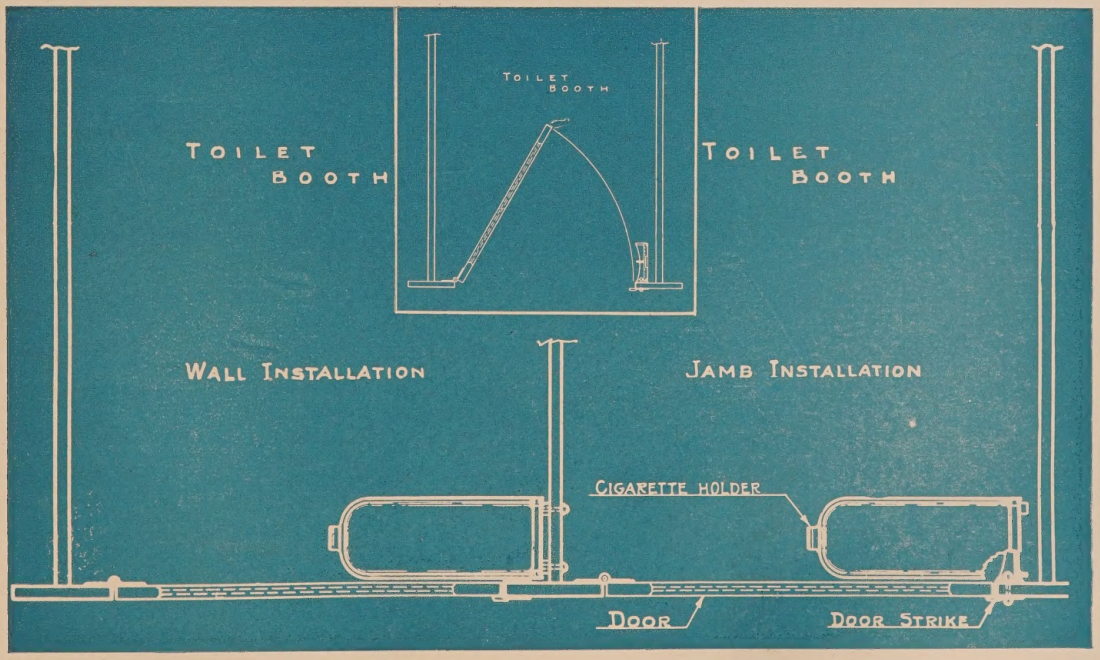
In the rear of wall closets, a pipe space or corridor of sufficient size should be installed—as shown in the floor plans. The water line supplying the closets should be equipped with an approved vacuum breaker. Also, a controlling valve should be installed in the pipe space to regulate the flow of water into the closet bowls.

Water closets should be installed in enclosures or stalls of ample size, supported from the ceiling, rather than standing on the floor. This type of enclosure, when used with wall-hanging fixtures, entirely eliminates obstruction on the toilet room floor. Cleaning is easier, more thorough.

In each water closet enclosure, in addition to the electric light mentioned above, an ultraviolet air-sterilizer unit may be installed for added sanitation. This ultraviolet radiation lamp, which comes in a recessed model for installation in the wall and a wall-mounted model, kills bacteria under conditions normally encountered in public toilets. It supplements the



THE STANDARD BUENA LAVATORY is popular for use in theatre washrooms. It is constructed of vitreous china, and its hard, durable, glazed surface is non absorbent, easy to clean and to keep clean. Like other modern Standard products for theatres, the Buena lavatory is designed to be wall-hung. Water control is by means of a self-closing floor valve, thus eliminating the need for faucets. Tempered water is provided through a mixing valve.



THE UTILITY SHELF — for milady's purse, gloves, packages, books, and things — is a modern convenience which merits consideration. Attached to the wall (left drawing) or to the jamb (right drawing), the shelf must be cleaned off and turned up (insert drawing) before the stall door can be opened. According to the Nik-O-Lok Company, through whose courtesy these drawings are used, the shelf is made of 18 gauge steel with satin chrome finish, with rolled edges, rounded corners, and a cigarette holder. The bracket, of chromium-plated cast iron, is designed to hold more than 200 pounds. The shelf is approximately 6 x 15 inches.

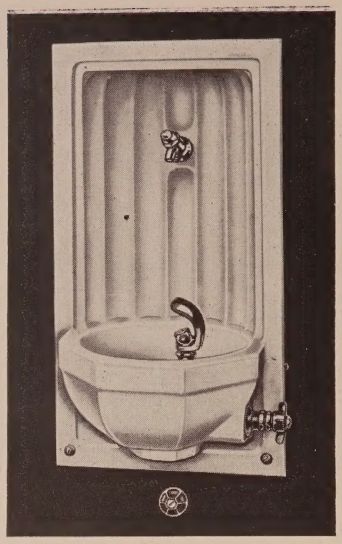
regular disinfecting procedure of cleaning and scrubbing.

An extra convenience provided in many women's toilet room enclosures is a handy utility shelf which may be lowered across the door to hold a purse and packages. Since the shelf must be closed before exit, it compels removal of all articles and nothing can be forgotten. Also, each enclosure should contain a toilet paper cabinet as well as a coat and hat hook.

NEW TYPE URINAL

For years the urinal has been a matter of concern in public and semi-public toilet rooms. Many surveys and studies were made of unsanitary and objectionable conditions arising from such installations. From this research American-Standard has developed the Expello urinal. It is constructed of vitreous china for maximum sanitation and comes in wall mounted models, as do lavatories and water closets. The Expello is designed to function like a water closet, having a large outlet to insure complete flushing. Stoppages common in other types of urinals are eliminated by this outstanding feature. The Expello may be equipped with foot-operated flush valves installed in the floor. The elimination of manual controls makes this urinal the most sanitary type possible.

Care should be taken that urinals are installed at the proper height—not more than 20 inches from the floor. This height permits proper use and prevents misuse often caused by too high urinals.



DRINKING FOUNTAINS, such as this Standard unit, should be built-in near entrances to toilet rooms. This fountain is sanitary and is constructed of non-absorbent vitreous china and can be had in white or a variety of colors to add a distinctive touch.

In each men's toilet room at least one urinal should be installed at a lower height to accommodate children. A height of 14 inches is recommended.

Along the line of special installations for children, lavatories and water closets, too, may be placed lower for the particular use of children. The same models of fixtures may be used, the difference being that they are hung lower on the walls. With juvenile height water closets, enclosures should be plainly marked to be used only by children. These special installations will be welcomed by children and parents alike

NEW BEAUTY WITH COLOR

Color in plumbing fixtures has brought new beauty to public and semi-public toilet rooms, as well as to bathrooms and powder rooms in the nation's homes. Plumbing fixtures in color, with their glossy surfaces and depth of tone, are the logical beginning in plans for bright, cheerful washrooms. Colors of walls, floors, ceilings, and decorative accents should be selected to harmonize with fixtures. The striking beauty of a modern theatre, large or small, can be carried effectively even to toilet rooms with the help of attractive, colorful plumbing fixtures.

These are highlights of the plumbing fixtures, fittings, and accessories featured in our ideal toilet rooms—rooms designed, constructed, and equipped for today and tomorrow. They are the most sanitary, convenient, and efficient washrooms possible, appreciated by all who use them. Thoughtfulness in providing patrons with the finest, not only in entertainment, but in extra conveniences as well, pays dividends in good will.

SECTION 2-D

PROJECTION *and* SOUND

1945

The Retiscope Screen Eliminates Distortion

Development of Special Fiberglas Screen Makes Every Seat "Down Front, Center"!

By PAUL DWANE BETHEL

Movie-goers and theatre managers will soon benefit from the "greatest contribution to the moving picture industry since sound." Occupants of seats in the first row, over next to the wall, will no longer have reason to complain of elongated figures on the screen, of eye-strain, or of echoing sound. Through invention of the Retiscope screen, these movie hazards are eliminated and every ticket-holder is provided with a seat "down front, center."

In search of the "perfect" screen, Warren Millais launched into years of experiment with new screen materials, various angles of projection, different screen sizes, and varying distances of throw. Out of his research has emerged a fireproof, washable, practically indestructible screen which eliminates distortion and eye-strain, regardless of the angle from which the screen is viewed.

Named after the retina of the eye, the Retiscope moving-picture screen does not require lens change, while mathematical calculations make it adaptable to the demands of every theatre in the world.

This revolutionary screen is composed of two surfaces — a sheet of Fiberglas stretched two inches in front of a second reflector sheet. Both sheets are laced to a screen frame so designed as to produce a mathematically calculated curve on the surface in both directions. Light passes through the loosely woven fiberglass onto the reflector sheet, enhancing whatever illusion of depth is inherent on the projected film. This eliminates screen lines and glare by diffusing and polarizing the light.

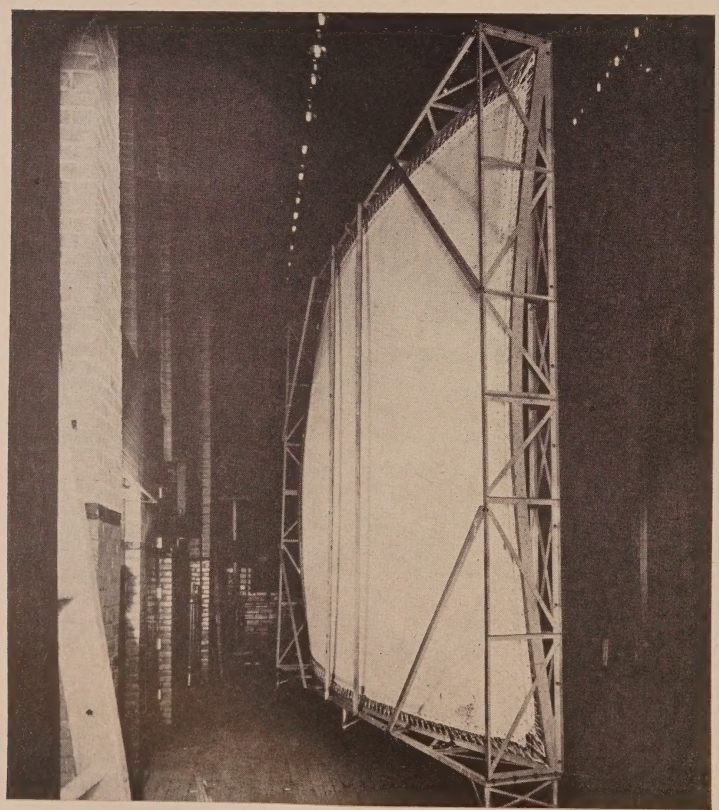
A theatre audience absorbs sound. In the past, as the theatre filled to capacity, a corresponding increase in volume became necessary. Likewise, as the crowd thinned, a decrease in volume was set. The fabric of the Retiscope screen allows all sound frequencies to penetrate at any volume setting. This tends to assure uniform sound reception regardless of audience size.

The development of the screen stems from the idle curiosity, some 25 years ago, of a resident of Prague by the name of Otto Hehn. He placed a photograph in front of his concave shaving mirror and glanced at the reflection. Curiosity turned to genuine interest when he noticed a surprising lack of distortion in the reflection, regardless of the angle from which it was viewed. Quick to realize the magnitude of the discovery, Hehn conducted a series of experiments on a new type of moving-picture screen, embodying the principle of reflection on a curved surface. A number of years later, he came to America, hoping to enlist the assistance of a motion-picture expert in the development of his idea. In 1941, he was referred to Warren Millais, who developed the Retiscope screen as it is known today.

Viewing projected images from all angles, the improvement of this screen over those of the conventional, flat type, is at once apparent. Distortion is nonexistent even when one stands directly under the screen, where the angle of sight is most acute. The effect is the same when the picture is viewed from extreme right and left—faces and figures are quite normal. The Retiscope screen is truly a contribution to the moving-picture industry and it seems inevitable that it will become as indispensable to theatres as is sound.

The Retiscope screen made a semi-public debut as far back as 1942, when the Pantages Hollywood Theatre held a premiere to demonstrate the screen to members of the press. All the major news services were invited, together with the drama editors of prominent West Coast newspapers. During the showing, this group was allowed to wander about the theatre to study the projection from all angles. This event was a tremendous success, and the screen received rave notices throughout the world. However, war news and wartime restrictions on material served to make publicity impractical and manufacture virtually impossible, so the project has been held in abeyance until now. During this lull, experiments were continued, resulting in an even greater improvement in the screen, to the point where the Retiscope screen is now in production.

THE HORIZONTAL AND VERTICAL CURVES of the Retiscope screen are especially noticeable when viewed from the rear. Laced tightly in the mobile framework of steel, the screen presents to the audience a concave surface, the degree of curvatures of which are mathematically determined from the physical characters of the theatre in which it is installed and from the type of equipment in the booth. The curvature eleminates distortion.



The Requirements of Projection Lighting

Screen Size Determines the Type of Lamp Providing the Most Pleasing Illumination

By HARRY H. STRONG
President, Strong Electric Corporation

The selection of projection lighting equipment best to meet the requirements of the various types of theatres is determined by the area of the screen which has previously been established by the style and size of the theatre itself.

PRINCIPLES OF LIGHTING

In a survey by the Subcommittee on Screen Brightness of the Society of Motion Picture Engineers, it has been determined that the most pleasing projection, with a minimum of eyestrain, is attained with a screen brilliancy of between 9 and 13 foot lamberts as measured with the projector running, but with no film in the projector.

Candles, Lumens, and Things

For convenience in calculating, let us take the even figure, 10 foot lambert, as the desirable brilliance, and further assume the screen to be in perfect condition and possessing 100 per cent reflectivity. This condition would require 10 foot candles projected to each square foot area of screen.

However, since the reflective efficiency of a screen is a variable factor beyond his control, the projection-lighting engineer prefers to calculate his equipment in terms of foot candles of projected light rather than in foot lamberts or screen brilliancy.

Accordingly, the light output of the projection system is generally measured in terms of lumens. The number of lumens which are projected to the screen surface have no real meaning until we associate them directly with the area of the screen surface that they are intended to cover.

Since various projectors, with their particular shutter designs, vary between 40 and 50 per cent in their ability to pass light, it becomes desirable in the calculations to eliminate these variables. For simplification, the projection-lighting engineer measures the amount of projected light when the shutter is not running and there is no film in the projector.

Since the average projector passes only 50 per cent of the light from the lamp and the average screen is only 75 per cent efficient as a reflector it becomes necessary to produce about 25 foot candles in the lamp so as ultimately to obtain the desired 10-foot lamberts at the screen when the projector is in actual use.

Actually, the lamp must, therefore, be capable of producing about 2½ times as much light as seems necessary on first thought. If we are to secure a screen brilliancy of 10 foot lamberts, we must, therefore, produce 25 foot candles of light to the film for every square foot of the screen area.

Light Volume and Screen Area

It is interesting here to note how this required light volume must necessarily be increased as the screen area is enlarged. In other words, if we had only a 1 square foot of screen, we could secure 10 foot lamberts with a projection lighting system producing 25 lumens.

A 12-foot screen has 105 square feet of area and accordingly would require 105 times 25 lumens, which is 2,625 lumens of light necessarily projected to the film to attain the pre-determined brilliance of 10 foot lamberts.

An 18-foot screen has 236 square feet of area and consequently requires 236 times 25 lumens or 5,900 lumens of projected light to obtain this same level of screen brilliancy. Likewise a 24-foot picture has 419 square feet of area and necessarily requires 419 times 25 lumens, which is 10,080 lumens of light to achieve satisfactory screen lighting.

THEATRE REQUIREMENTS

Since it is uneconomical to build a single lamp that is adjustable in light capacity to meet this wide variance in light requirements, the projection lighting equipment manufacturers have developed a series of lamps in a wide range of capacities and prices to meet the pocketbook and satisfy the lighting requirements of various size theatres.

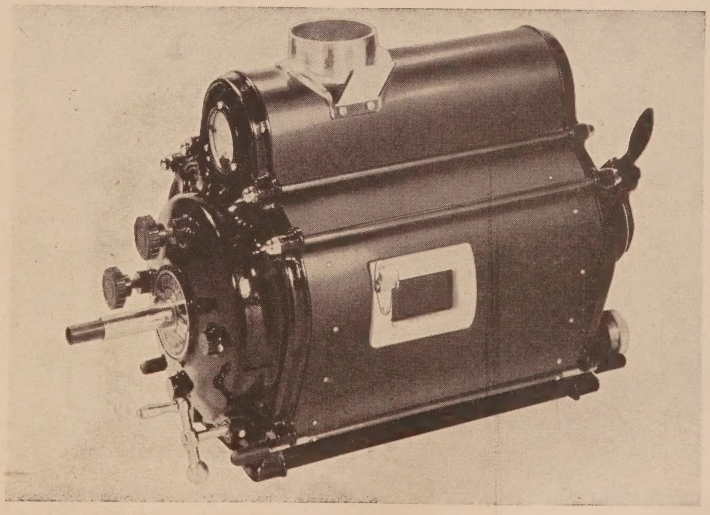
Small Theatres

For clarity, we will first discuss the small theatre of 200- or 300-seat capacity with its 10-foot screen, theoretically requiring 820 projected lumens.

Since this theatre must operate at the very lowest cost of current and carbons, the low-intensity arc, projecting 2,200 lumens, is often used, despite the fact that the quality of this low-intensity light is slightly yellow in color and, accordingly, not entirely suited to good projection. Operating cost, and not quality of projection is the controlling factor in this instance. However, if the volume of patronage allows, or the audience is inclined to be critical of the quality of the projected picture, even these small theatres should install nothing less than the 1-kw. high-intensity arc, projecting 4,200 lumens, and resulting in a projected picture of a color and quality comparable to that found in the deluxe houses.

The low-intensity lamp employs only low cost pure carbon electrodes. Accordingly, the carbon cost is but 3 cents an hour, and, since the electric current consumption is low, the over-all operating cost is only 13 cents an hour. This lamp requires only an economical 2-tube rectifier.

THE LOW-INTENSITY LAMP, using pure carbon electrodes, generally operates between 20 and 30 amperes, with a potential drop across the arc of 50 to 55 volts. While the light from this lamp is slightly yellow, it does throw 2,200 lumens of light on the screen and is the most economical of all projection lamps to operate, and, in theatres up to 300 seats, has proved a satisfactory illumination source. (Strong Electric Corporation photograph.)



THE HIGH-INTENSITY LAMP, as exemplified in the 65-ampre Mogul, is utilized in the largest of theatres, with screens 24 feet or more wide. Throwing better than 10,000 lumens of excellent light on the screen, these lamps employ cored, copper-coated carbons. The estimated over-all operational cost of such lamps is $1 an hour. For still more efficient screen illumination, the use of coated lenses is urged. (Strong Electric Corporation photo.)

Moderate Size Theatres

The majority of theatres employing screens up to 18 feet in width catering to a more critical patronage accordingly must have projection comparable to that of the best houses, regardless of other operating economies which must be effected.

To supply the requirements of these moderate size theatres, there has been developed the very popular 1-kw. high-intensity arc lamp that projects about 4,200 lumens of snow-white light, a light possessing the qualities so necessary to the perfect projection of Technicolor pictures.

This 1-kw. lamp, with its associated rectifier equipment, has been produced as a low first-cost item of equipment, which will perform perfectly on single-phase power circuits, since only single-phase power is generally available to this type of theatre.

The over-all cost of current and carbons in this 1-kw. lamp is just 2 cents an hour more than with the low-intensity arc. However, since this high-intensity lamp projects twice as much light as the low intensity one, the actual cost of light is less for a lumen-hour than in the instance of the low-intensity arc.

Following these same calculations the very large theatres, with screens up to 20 feet in width, require 7,300 lumens to maintain a screen brilliancy of 10 foot lamberts as required for deluxe projection.

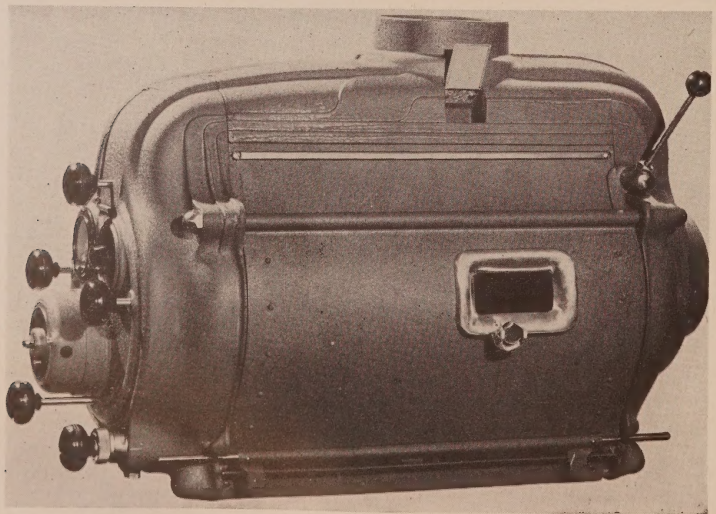
These large theatres require a high-intensity arc, burning up to 70 amperes and employing a 14-inch reflector. The carbon costs for these lamps are 13 cents an hour. In addition, these large lamps require 6-tube rectifiers, a copper-oxide rectifier, or a motor-generator set with a current consumption of 4-kw., making a total overall operating cost of 29 cents an hour for current and carbon.

The "Palaces"

Extremely large theatres using tremendous screens of 24 feet or more, having a screen area of at least 419 square feet and requiring over 10,000 lumens of light—to say nothing of drive-in theatres with screens of 40 feet in width and theoretically requiring 30000 lumens—have always experienced difficulty in obtaining the desired screen brilliancy of 10 foot lamberts. The largest condenser-type, high-intensity projection lamps operating at 130 to 175 amperes with an over-all cost of current and carbons of $1 an hour has been the most powerful equipment available. However, these lamps produce only about 10,000 lumens, as compared with the 30,000 lumens desirable.

Future developments point toward a larger lamp of higher projected-light volume and employing 16-inch reflectors with 9-mm., copper-coated, high-intensity carbons operating up to 90 amperes, in which the position of the arc crater, relative to the focal point of the reflector, will be maintained constant by means of a supplementary optical and electrical system which controls the speed of the carbon feed motors. These future lamps, when used in combination with the new, high-speed, coated projector lenses, hold promise of at least partially solving this projection problem.

THE ONE-KILOWATT LAMP is valuable for use in theatres employing screen sizes up to 18 feet in width. It is a high-intensity arc which projects about 4,200 lumens of snow-white light. Such light possesses the desirable qualities necessary for the most satisfactory projection not only of black-and-white pictures, but of Technicolor productions as well. Over-all operational cost is about 29 cents an hour. (Strong Electric Corporation photo.)

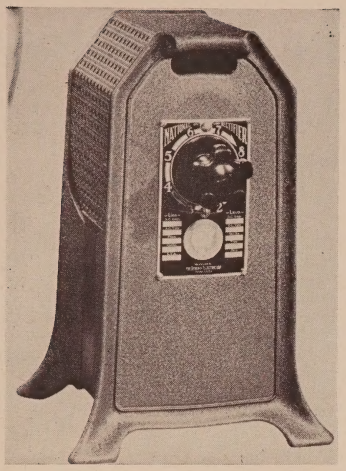


CURRENT CHANGERS

All of the arcs mentioned here necessarily require direct current for their operation; however, alternating current is generally the only type of electricity available in theatres, as a.c. is the only means of transmitting electric power over long distances. Therefore, each theatre must have its own means of converting the a.c. power to direct current for use at the arc. The various types of arcs each require a definite and specific relationship between arc amperage, arc voltage, and the amount of line voltage resistance or ballast for stable operating of the arc.

Low-Intensity Lamps

In the case of the low intensity arc, operating between 20 and 30 amperes, the potential drop across the arc is 50 to 55 volts. However, for stable operating of this low-intensity arc, the d.c. power supply should be at least 80 volts



THE 30-AMPERE TUBE RECTIFIER is for theatres with lamps of less great electric demands. It is essential that the theatre have the proper current-changing equipment. (Strong Electric Corporation photograph.)

and may be as high as 110 volts and requiring a ballast resistor in series with the arc sufficient to maintain a voltage drop across the ballast of at least 30 volts. This d.c. power is most conveniently obtained through the use of the conventional 2-tube, single-phase rectifier, which has the necessary reactance to result in this desired voltage drop without the use of wasteful ballast resistors.

In the past, when low-intensity lamps were the only source of screen lighting, satisfactory arc performance was attained by employing most any haywire hookup, wherein sufficient ballast resistance was connected in series with the arc so that it reduced the arc current to the desired number of amperes, without regard to the voltage of the d.c. power supply.

High-Intensity Lamps

However, with the introduction of the more critical high intensity carbons, most stable operation is attained only through a rather exacting relationship between arc voltage, arc amperage, line ballast and d.c. power supply voltage.

In the case of the 1-kw. arc, burning at 40 amperes with 28 volts, the d.c. power supply, as measured without the arc load, should not exceed 35 volts—that is a drop of 6 volts in the line ballast—because a higher power supply voltage with more ballast, while obviously reducing the current to 40 amperes, would never result in a smooth burning arc, free from color change at the screen, and this higher voltage would require frequent adjustment by the projectionist of the lamp controls.

A high-intensity arc operating at 45 to 50 amperes with 35 volts across the arc performs best when the d.c. power-supply potential is about 60 volts and there is 25 volts drop across the ballast resistor. A 65-ampere arc, burning at 40 volts, should have a d.c. power supply of about 60 to 70 volts with a ballast of 30 volts.

Consequently, in selecting a power supply for lighting equipment due consideration should be given the recommendation of the lamp manufacturers for each type and capacity of arc lamp.

In the case of the moderate sized theatre, with its 18-foot screen and its 1-kw. arc, the 4-tube, single phase rectifiers designed especially for use with this lamp results in most stable operation.

The larger theatres, employing 50 to 70 amperes, may use either motor-generators or the copper-oxide or six-tube rectifiers which have been designed especially to supply direct current to the large lamps. Because of the heavy electrical load, these larger rectifiers or generators must be supplied from 3-phase power circuits, which are always available in these theatres.

CORRECTIONS, PLEASE!

Amperage and Light

Theatremen quite generally have the mistaken impression that simply to increase the amperage at the arc must necessarily result in more light at the screen, or that a large lamp may be burned at low current satisfactorily in an attempt to reduce operating costs. However, this is not actually true, because each arc amperage requires a matching optical system.

To be specific a low-tensity arc, burning 25 amperes, has an arc crater which is approximately 6 mm. in diameter. it follows that the optical system must reflect the arc crater as a 6-time magnified image of the crater, at the film aperture.

Principles of Reflectors

The magnification of an optical system employing an elliptical reflector system is a function of reflector focus and its working distance; that is, the size of the crater will be magnified as a spot at the aperture as many times as the distance from the arc crater to the center of the reflector is contained times into the distance from the center of the reflector to the film aperture.

In the instance of the low intensity arc, which requires a magnification of six times, the standard low-intensity reflector has a focus of 4 inches with a working distance of 24 inches, which is a ratio of 6 to 1 and, accordingly the system has a magnification of 6 times, so that the spot at the aperture is six times as large as the arc crater or just sufficient to cover the 36-mm. aperture opening without undue loss of light.

Likewise other types and capacities of arcs have their characteristic peculiarities and dimensions that require specific consideration at the time the lamp and its reflector are designed uniformly to illuminate the fixed area of the film aperture, that is, a higher current lamp with a consequently larger light source, requires an optical system with a lesser magnification than does the small crater area of the 1-kw. arc.

Reflector Diameter

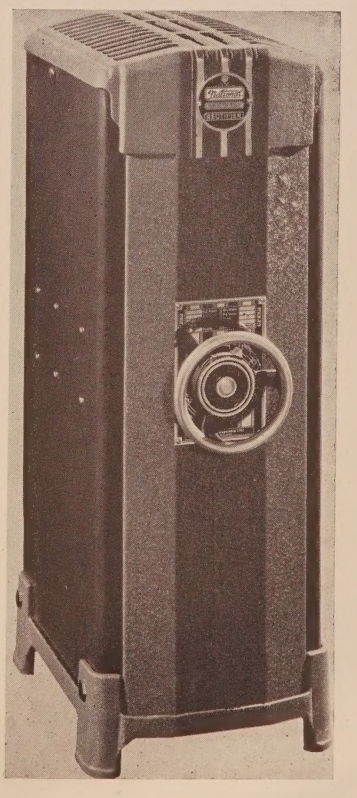
There is, generally, confusion in the minds of projectionists as to the relative efficiency of lamps employing small diameter reflectors as compared to those employing the large diameter reflectors. In explanation, the reflector diameter is designed to work with the projector lens system. In other words, the diameter of the reflector is calculated to project a 26-degree conical beam of light converging at the aperture.

Accordingly, when employing positive carbons 8 inches in length, the reflector must be set back 24 inches from the film aperture, so a reflector about 11 inches in diameter is necessary to fill this light angle of 26 degrees, whereas if a 14-inch length positive carbon is employed the reflector must consequently be set back about 30 inches from the film aperture, and a reflector 14 inches in diameter is necessary to fill this light angle.

CONCLUSION

There are, of course, many other considerations in the design of projection-lighting equipment for theatres and of the optical systems and current-changing devices used in connection with them. But these few simple facts indicate the absolute necessity of operating any projection equipment under the exact conditions that have been the contributing factors in its design for this particular use.

THE SIX-TUBE RECTIFIER is suggested for the larger theatres, to supply the direct current for arc lamps. Because of the heavy load, a 3-phase power circuit is needed. (Strong Electric Corporation photograph.)



Provider of D. C. Current: The Generator

Advantages of Motor Generators Set Forth In Relation to the Best Projection Lighting

By H. P. Sherer and E. T. Rummel

Chief Engineer and Sales Engineer, Respectively, Hertner Electric Company

The carbon arc used as the light source in most projection lamps for the motion-picture industry has a resistance characteristic requiring true direct current and constant voltage for stable operation. That is, while the most common loads applied to a direct-current generator are such that the current increases proportionally to the voltage, and vice versa, with an arc this is not the case, as the resistance varies with the current.

Failure to provide true direct current results in arc hissing and hum which may be picked up in the sound system, and lack of constant voltage results in arc instability which shows up as reduced light or a bad color of light on the screen.

Practically speaking, there are two sources of true direct current power, the first being the storage battery and, the second, the homopolar generator. Neither of these, however, are suited for motion-picture arcs. Running a close second to these is the direct current generator designed for motion-picture service. Next on the list probably are various classes of rectifiers. But, without increasing very greatly the number of phases or adding a stabilizing coil in the output side, rectifiers do not run even close to motor-generator sets in this respect.

CURRENT CHARACTERISTICS

A suitably designed motor generator provides constant voltage independent of load in range well beyond the nominal rating of the generator. This feature provides an inherent overload capacity not found in other types of rectifying equipment. No damage is caused to the motor generator because of the loss of the arc. Breaking the direct-current power side of tube rectifiers may cause tube flash-over and consequent failure.

A great advantage in constant light output is gained in using a motor generator over other types of rectifying devices, because the motor speed varies only slightly with changes in alternating current line voltage, even with quite large fluctuations. This is because motor speed is dependent on a.c. power supply frequency rather than voltage. It is a known fact that the power supply frequency never varies as attested by the way electric clocks, also governed by the a.c. frequency, never gain nor lose.

This inherent characteristic of alternating current motors gives the particularly worthwhile feature to motor generators that cannot be claimed by other types of rectifying equipment. It means constant, unvarying light intensity on the screen regardless of the changes in a.c. voltage which cause other types of rectifying equipment to vary the light output to the screen. The d.c. voltage of rectifiers varies proportionally to the a.c. supply voltage, while in the case of the motor generator, the generator being mechanically connected to the motor will only change in d.c. voltage proportionally to the change in speed of the driving motor, resulting in constant direct current voltage and hence, constant light output.

By referring to Figure 1 (Curve B), it will be noted that when the alternating-current line volts drop to 80 per cent of the nominal value, the direct-current output voltage is maintained at 98.2 per cent of the normal voltage and that, at 125 per cent of nominal alternating-current line volts, the direct-current voltage has increased to 102.5 per cent of normal.

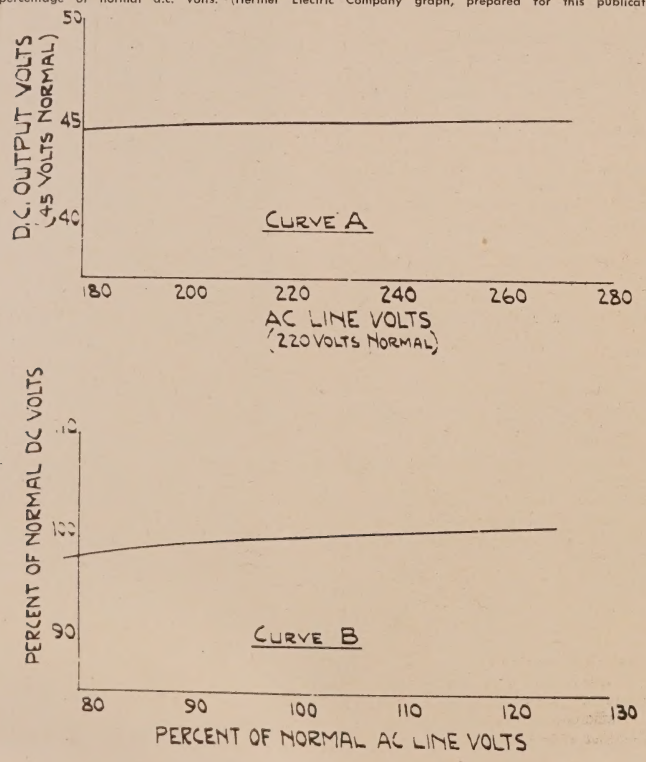
Very few power systems in the United States are so regulated that, during certain parts of the day, the a.c. line voltage is regulated better than within 5 to 10 per cent. This is especially true later in the evening as the domestic, manufacturing, and transportation load drops, resulting in an ever-increasing voltage. Obviously, this cannot be corrected for by changing taps, inasmuch as during some other portion of the day the voltage will pass through the nominal value.

This means that, with rectifying equipment of the type in which the output varies proportionally to the a.c. input, the output voltage will vary in the neighborhood of 5 to 10 per cent during this period. The deleterious effect in light resulting by these voltage changes is well known to most projectionists.

In Figure 2 are presented graphic curves showing the amount of disturbance transmitted by various types of converting equipment from the alternating current power supply line to the direct current arc circuit.

When a motor generator is used, disturbances in the a.c. power supply are not transmitted into the d.c. arc circuit —partially because there is no electrical

FIGURE 1.—Input-output voltage curves, showing the small amount of change in d.c.-operating volts with a large variation in the a.c. power-line voltage. Curve A shows actual d.c. voltage change with an HI-50-100 TransVerteR carrying a normal single arc (50 amperes). Curve B shows the same data expressed in terms of the percentage of normal d.c. volts. (Hertner Electric Company graph, prepared for this publication.)



connection between the motor and the generator and partially because of the flywheel effect of the rotating armature. From the first set of curves in Figure 2, which are for the flat compound motor-generator, it can be seen that sudden normal changes in a.c. power supply have no effect on the d.c. arc circuit.

The second and third set of curves in Figure 2 show the amount of disturbance transmitted to the d.c. arc circuit by two other common types of rectifying equipment. Notice that the direct current supplied to the arc follows the changes in a.c. line voltage very faithfully, and that the amount of change in direct current due to varied nominal changes in a.c. supply voltage are much greater than can be tolerated for quiet and stable arc operation.

Because there is no electrical connection between the alternating current input voltage and the direct current output to the arc where a motor generator set is used, no ripple or harmonics in the d.c. power are reflected whatsoever into the a.c. line to affect the speaker systems.

In Figure 2 are presented graphic curves showing the amount of ripple transmitted by various types of converting equipment from the alternating current line to the direct current arc circuit. Notice that the d.c. current supplied to the arc follows the changes in a.c. line voltage very faithfully because of the flywheel effect of the rotating armature, and that the amount of change in the current due to varied nominal changes in a.c. supply voltage are much more than can be tolerated for quiet and stable arc operation. In a motor-generator set, there is no electrical connection between the alternating current input voltage and the direct current output. This means that any ripple or harmonics in the d.c. power are not reflected whatsoever into the a.c. Rectifiers of the type usually supplied for motion picture arc service are connected electrically between the a.c. input and the d.c. output. This allows harmonics from the rectifier to be reflected into the a.c. line and these harmonics are of the order $6a \pm 1$, where a is any positive integer. Also, on the direct-current output side, harmonics are superimposed on the nominal d.c. ripple and the order of their frequency is na, where n is the number of phases in the rectifier and a is any positive integer. The magnitude of these harmonics is proportional to the reactance of the load circuit.

The direct current generator designed for arc service does not pass on harmonics to the arc circuit, but only a small amount of inherent ripple due to the commutator. The magnitude of this ripple is only a small percentage of that normally found in the output of a three-phase rectifier.

MAINTENANCE

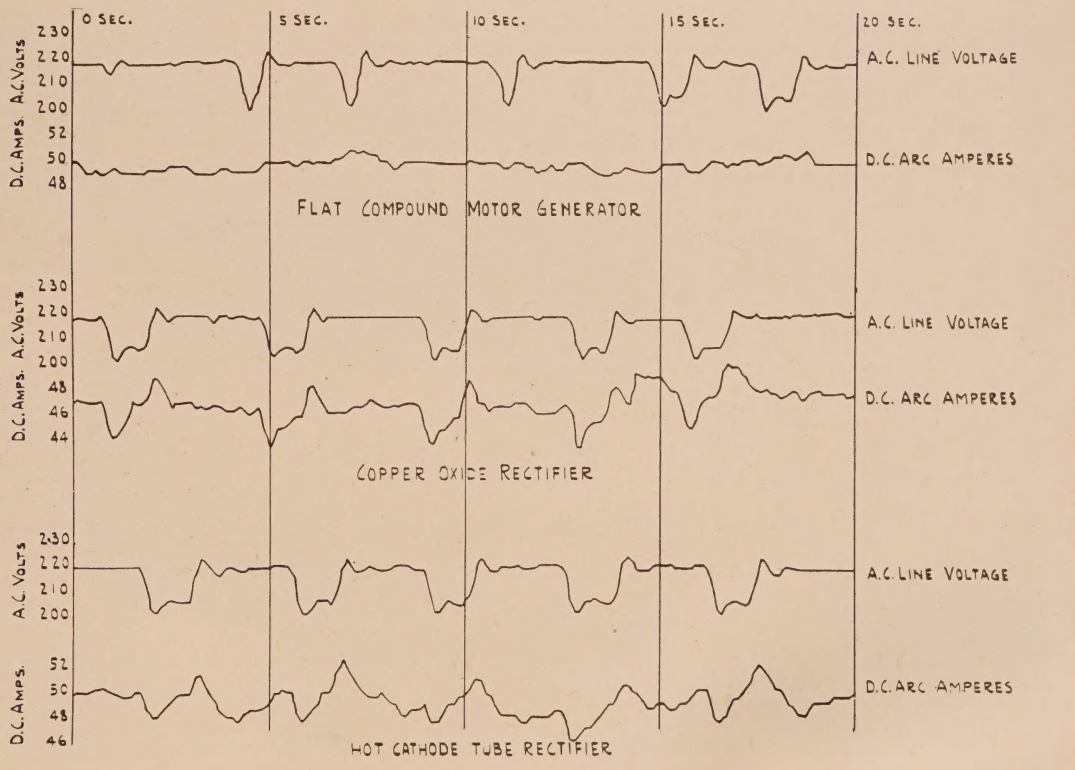
The motor-generator set, while it contains a rotating member, still requires only an extremely small amount of maintenance. Practically all sets are equipped with high grade ball bearings which do not require lubrication more often than every three to six months, and the only other preventive maintenance suggested is the occasional blowing out of dust and dirt which normally accumulates on any type of equipment.

The only part of rotating equipment which can be said to be normally consumed in service are the carbon brushes used on the commutator. Brushes, as now manufactured and applied, should run for a period of at least five years without replacing. This item is relatively inexpensive at such time as replacement is required.

Arguments can be advanced pro and con regarding the proper location of rectifying equipment including motor generator sets for projection service. The motor-generator set is usually installed in a very small, well-ventilated room adjacent to the projection booth. It can be installed in a room so as to be entirely unobserved practically all the time due to the low maintenance and faithful service inherent with this type of equipment.

It is generally desirable to locate other types of rectifying equipment very close

FIGURE 2.—Graphic curves showing the amount of disturbance transmitted by various types of voltage-converting equipment (flat compound motor generator, copper oxide rectifier, and hot cathode tube rectifier) from the a.c. line to the d.c. arc circuit of low-voltage, high-intensity, non-rotating arcs due to a.c. line fluctuations. The tests were made with Suprex 7-mm. by 12-inch positives and 6-mm. by 9-inch negatives. Notice that the d.c. current supplied to the arc follows the changes in the a.c. line very faithfully because of the flywheel effect of the armature. (Hertner Electric Company graph, prepared for this publication.)



to the projection lamp. While advantages are claimed in that this feature saves a small amount of original expense in installation, let us observe the other results. In the first place, bulb type rectifiers are installed in the projection room so that in case of failure the operator can quickly replace this unit. There are other cases in which it is necessary to have them so installed. Because of the small amounts of vibration transmitted into a building by nearby traffic bulbs may become loose in their sockets and break the circuit.

Also consider the amount of unnecessary heat in the projection room caused by installing any rectifying device directly in it. Take, for instance, a rectifier of the bulb type which is delivering 50 amperes at 33 volts. Let us assume an overall efficiency of 60 per cent. This means that the input power to the rectifier is 2750 watts and output power is 1650 watts. The difference between 2750 and 1650 represents the inefficiency of the rectifier which is dissipated as heat.

Anyone familiar with the ordinary type of radiant heater will know that constant dissipation of 1100 watts in the form of heat in the ordinary projection booth does not add to the comfort of the projectionist, especially in the summer time.

EFFICIENCY

Much has been said and written about the efficiency of motor generator equipment compared to the other types of rectifying equipment. We believe that most people are familiar with the efficiency obtained from a well designed and proportioned low-loss motor generator set, and typical values of efficiency can be obtained from most any handbook. We note in the case of most rectifiers that claims are made for efficiency anywhere from 40 to 70 per cent, depending on the period of use of the rectifier. Tests which have been conducted by our company indicate that the efficiencies of motor-generator equipment and other rectifying equipment for arc service are comparable when the rectifier is new, but manufacturers admit that the efficiency of plate type rectifying devices decrease with age.

The efficiency and output of the motor-generator set do not decrease with age. In fact, after a period of several weeks' usage, it is a known fact that the brush friction decreases and also in many cases the bearing friction will decrease slightly. In this event, the efficiency, of course, would increase during this period. In any later period, the efficiency would remain absolutely constant, barring no further change in brush friction or bearing friction during the normal life of the equipment. There are no parts in this rotating equipment which age, insofar as having any effect on power or efficiency.

High room temperatures have little effect on a properly designed motor generator. However, some types of dry plate rectifiers age far more rapidly, requiring the replacing of the rectifying element, when the room temperatures are higher than 98 degrees Fahrenheit, a not uncommon temperature in most projection rooms in the warm summer months.

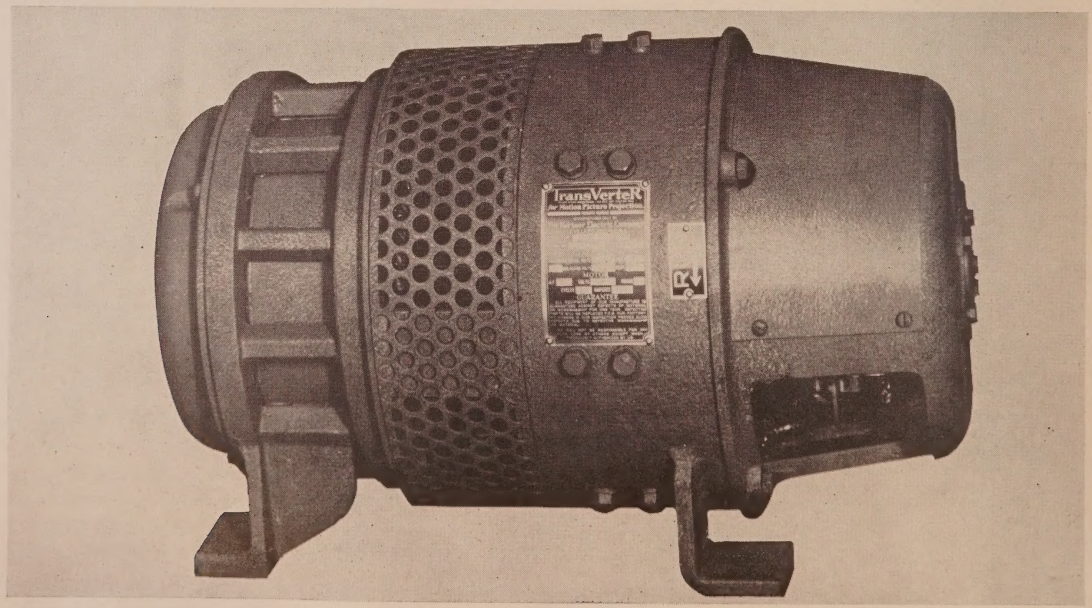
In order to protect from overheating, a fan is usually provided in most types of rectifying devices including the motor generator. In the case of the motor generator the fan is an integral part of the rotating element and requires no attention or outside source of power to drive it. Some rectifiers use the 110-volt lighting circuit to operate a separate driven fan which, incidentally, is also a rotating device, and a failure of the 110-volt circuit on the fan itself could shut the rectifier down even though the normal power supply was available.

The windings and core of a motor-generator set compare to the transformer section of a rectifier. These parts can normally be expected to last until obsolescence of the equipment. Bearings, if kept clean and lubricated according to instructions, should never need replacing. This leaves the commutator as the only other element, outside of the brushes previously mentioned, which has a slight amount of wear. This wear is very slow.

As a motor generator set reaches the state where some repair or maintenance is required, it generally gives warning, similar to the condition existing in a car which needs new piston rings. In other words, in this comparison, your car serves notice by gradually consuming more oil. It is found likewise in any motor-generator set that you are generally warned. Failures of other types of rectifying equipment would compare favorably to a tire blowout on a car.

Telephone interference factor and radiated noise are receiving more and more attention by the manufacturer and by the public. The first element mentioned would not ordinarily exist in a motor generator set of this type while the latter could. However, radiated noise of this origin fades out very quickly as distance from source increases. For instance, at three feet from the generator, a sensitive radio receiver could barely detect it. In rectifiers, telephone interference factor may become troublesome due to the harmonics fed into the alternating current supply lines in some instances.

TYPE LV-40-80 TRANSVERTER is typical of the products made for current-converting purposes. It is this type of motor generator with which the present article deals. The motor generator designed for arc projection service has earned its place by usage and inherent proved characteristic of stable voltage, low ripple, long life, low upkeep, no replacement of rectifying elements, overload capacity, independence from effects of a.c. line-voltage fluctuations, isolation of a.c. and d.c. circuits, constant efficiency, and no aging effect. Over-all efficiency is the combination of all these assets. (Hertner Electric Company photograph.)



Provider of D. C. Current: The Rectifier

Discussion of the Copper-Oxide Rectifier As a Means of Converting Theatre Current

A score of years has passed since the discovery by Dr. Lars Olai Grondahl, of the Union Switch and Signal Company, that large areas of copper coated with cuprous oxide could be made to change alternating into direct current. The development of a rectifier with large contact area came at an opportune time, resulting in an immediate large business from the need for such rectifiers as trickle chargers for the radios of the early twenties.

In the past twenty years, the rectifier has come a long way. Those closely connected with it feel that it has by no means reached its limits, but that future developments will broaden its field far beyond what can be seen now. Even if no further gain be made, however, the copper-oxide rectifier still remains an exceedingly useful tool in many varied forms. Certainly there is yet no evidence of any tapering off in the rate of new applications for the copper-oxide rectifier.

In passing, it is interesting to note that no theory which explains all the known facts has yet been found for the "why" of rectification by copper oxide.

TECHNICAL DETAILS

Copper-oxide rectifiers, which, 10 or 15 years ago, were limited in size to 3 or 4 watts and used for charging radio batteries, have gradually increased in capacity to sizes up to 40 kw. The motion-picture industry has used copper-oxide rectifiers ranging from a fraction of a watt for metering purposes to several kilowatts for carbon arc power supply.

Mechanical Construction

The copper-oxide rectifier is fundamentally a very simple device, consisting of three elements: (1) a good conductor (copper), (2) a poor conductor or semiconductor (red cuprous oxide), and (3), an insulating layer, known as the barrier layer, located between the two large conductors. (The barrier laver has never been actually located or identified, but its existence and dimensions have been determined by measurements of electrostatic capacity and other careful experimental work. The cuprous oxide is formed from the copper at temperatures approaching the melting point of copper.

To provide a suitable low-resistance contact to the oxide, one of two assemblies may be used.

The pressure type or washer type consists of copper-oxide washers, terminals, lead washers against both surfaces of the copper-oxide washer, and two heavy washers to provide a uniform high pressure over the entire surface. The function of the lead washer is to take up irregularities in the surface of the copper-oxide washer, thus insuring against damage from excessive localized pressure. It also serves as a current collecting means. The pressure-type assemblies range in capacity from .015 watt for the small metering rectifier to 27 watts for the largest design using 3⅝-inch-square cooling fins. As the current capacity is increased, the rectifying area must also be increased. While this may be accomplished by paralleling a number of washers, it is more practical for current ratings of 15 amperes, or above, to use the larger plate.

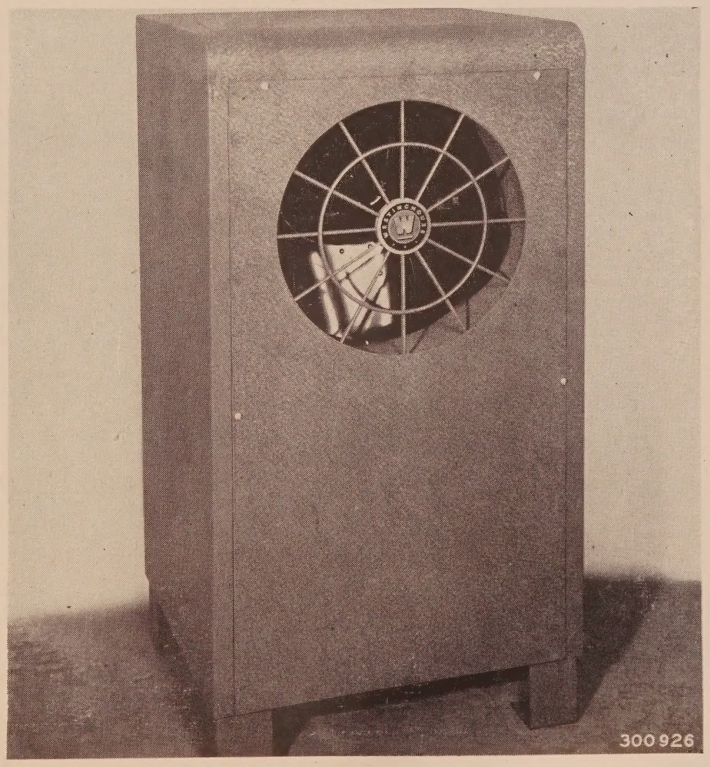
Since it is almost impossible to apply a uniform high pressure over a large area, and since the problem of cooling for large pressure type assemblies becomes very difficult, a type of construction requiring no pressure was developed. This type has been designated as the plate-type rectifier. The lead washer used in the pressure type construction is replaced by a metal coating applied to the oxide either by spraying molten metal or by electro-plating.

Single rectifier plates are usually oxidized on both sides, but for some applications more satisfactory results are obtained if only a portion of the surface is utilized for rectification. The balance of the oxide surface then serves as a heat-dissipating medium.

Electrical Characteristics

When copper oxide washers and plates are properly processed, the resistance to current flow from copper to cuprous oxide, commonly known as reverse resistance, is relatively high and from cuprous oxide to copper, commonly known as for-

TYPICAL OF THE COPPER OXIDE RECTIFIERS described in this article is the Westinghouse Electric Corporation's Rectox (photo courtesy of the Radio Corporation of America), supplied to the theatre trade through authorized RCA theatre-equipment distributors. The rectifier is a very simple device, consisting of a good conductor, one not so good, and a barrier (insulating) layer. While it is known how it works, the "why" has never been explained.



ward resistance, is relatively low. In production, the ratio of resistance will be in order of 10,000 to 1. Ratios up to 60,000 have been obtained in laboratory tests. Any material which possesses such asymmetric resistance characteristics can be used as a rectifier. The commercial application depends upon satisfactory efficiency, regulation, costs, size, and life. That copper oxide rectifiers meet these standards to a very high degree is evidenced by their wide use in industrial applications.

Rectifier Circuits

The simplest rectifier circuit is the single-phase, half-wave type. Its use is restricted to low-current battery chargers and a few special applications requiring half wave rectified current.

A full-wave, single-phase rectifier may be either the center tap or the bridge type. The wave form is the same for both circuits, the instantaneous current value dropping to zero twice every cycle. Such circuits are widely used for battery charging and the majority of magnetic coil leads.

For motion-picture equipment, a conventional filter is ordinarily required to reduce the ripple to an acceptable value. Filtering is economical for capacities up to several hundred watts, but for larger sizes it is customary to use polyphase rectification. Copper oxide rectifiers for projection arc supply use their connection for maximum efficiency and to insure a light free from flicker.

One type of circuit occasionally used for power rectifiers is the Scott connection for transforming three-phase to two-phase before rectification. It is ordinarily used for tube-type rectifiers to save the cost of two tubes, but for copper oxide rectifiers there is no advantage in its use. The wave form indicates that it may be responsible for screen flicker, particularly when used with the Suprex arc.

Rectifier Ratings

The output of the copper-oxide rectifier, like most other electrical equipment, is limited by temperature. The earlier designs of 3 to 4 watts rating were made without cooling fins; but, as the ratings increased, cooling fins were added to increase the output of each washer. The addition of cooling fins increased the output of a 1½-inch diameter washer from .08 to .55 watts.

For ratings of 500 watts or over, the size of naturally cooled rectifiers becomes rather excessive. The addition of a cooling fan increases the flow of air and consequently the rating of each washer. Corrugated copper cooling fins to provide maximum heat dissipation were designed and first used for motion-picture projector-arc supply. Continued investigation indicated further economies by the use of plate type rectifiers, in which the rectifying surface also serves as the cooling surface. This development was made possible by the development of the metal coating over the oxide, which eliminated the necessity for high-contact pressure.

By a long series of life tests in the laboratory, and verified by field operation, the limits of voltage and current have become well defined.

For example, four 1½-inch diameter discs without cooling fins, connected in a bridge-type circuit, are rated at 3 volts, 0.11 amperes. By addition of cooling fins and spacing washers, the rating is increased to 4.5 volts, 4.15 amperes. The use of a suitable fan increases the rating to 5 volts, 1.0 ampere.

Four fan cooled plates, 4⅜" x 12", connected in a single-phase, bridge circuit, are rated at 5 volts, 30 amperes. When connected in a three-phase, bridge circuit and used for intermittent service, such as projector arc supply, ratings up to 7 volts and 65 amperes a plate are used.

Life

Commercial installations and laboratory life tests of copper-oxide rectifiers over a period of many years have definitely established their exceptionally long life. The rectifier resistance, however, increases with time, resulting in a drop in output. This aging is most pronounced in the first six to twelve months of operation, after which the characteristics stabilize.

Compensation for aging is usually provided by transformer taps, for increasing the voltage applied to the rectifier. It is recommended that output be checked after six months of operation and at one- or two-year intervals thereafter.

THEATRE APPLICATIONS

The naturally cooled pressure-type assembly has been used for motion-picture equipment for approximately ten years. They have been supplied for loudspeaker field excitation, for amplifier-tube filament supply, and for exciter-lamp supply.

With the introduction of the Suprex arc came the development of a fan cooled copper-oxide rectifier for arc supply. The earlier models used the washer type of assembly but present designs use the more recent plate type construction.

The use of copper oxide rectifiers for arc supply has a number of decided advantages. These advantages briefly are (1) no moving parts, with the exception of a small cooling fan; (2) quiet operation; (3) dry metallic rectifying elements, containing no glass or fragile parts; .4) high efficiency; (5) low maintenance; (6) instantaneous operation—no time lag in starting—with the full load being carried at once; (7) voltage adjustment made by changing transformer taps, eliminating losses in ballast rheostats; and (8) unit assembly, with all parts contained in one cabinet and no separate motor starters or ballast resistors required.

Installation

The rectifier should be located in or near the projection room to eliminate voltage drop in long cables.

Circulation of air through the ventilating holes must not be impeded, and provision should be made for ventilating the room in warm weather.

Humidity also affects the disc-type of rectifier, if unprotected, by acting on the Aquadag coating and increasing the forward resistance of the rectifier. These effects can be guarded against by the use of suitable high-grade varnish coatings. Varnish coatings also protect against mildly corrosive conditions.

The fan and contactor coil are connected to a 110-volt supply through a switch on the projector. The three-phase power supply connections are made to terminals either on the contactor or terminal board. The output is connected to the arc lamp terminals. The knife switch for controlling the arc should be removed from the circuit or wired in closed position to prevent operation of the rectifier on open circuit.

Proper line voltage taps must be selected by checking line voltage with a meter. Proper secondary taps must be selected by test.

Operation

To start the operation of this rectifier, turn on the 110-volt switch at the projector lamp, which applies power to the cooling fan and also to the small contactor, which in turn energizes the prime winding of the transformer. As soon as this contactor closes, power is available and the arc may be struck. The operation of the arc is the same as with any other sort of power supply. To shut down the arc, turn the switch at the projector lamp, which will stop the fan and de-energize the transformer primary.

The transformer primaries are provided with taps for line voltages from 190 to 250 volts a.c. Secondary taps are provided for current adjustments and also to take care of rectifier aging. After the rectifier is installed and properly adjusted, it will be unnecessary to change taps more than about once a year. The cooling fan is equipped with ball bearings which are permanently lubricated; and which will require no further attention.

It will be noted that by proper design of the transformer, it is possible to limit the current at the moment the arc is struck and at the same time obtain good voltage regulation in the current range through which the Suprex carbon should operate.

The high efficiency obtained from copper oxide rectifiers indicates an appreciable saving in the annual power bill for projection. The efficiency of the copper-oxide rectifier is approximately 68 per cent; for a typical bulb-type rectifier of the same rating, 58 per cent; and for the copper-sulphide-type about 40 per cent. The efficiency of a typical 60-volt generator for this service is approximately 65 per cent, but since a ballast resistor is required to bring the voltage down to approximately 35, the over-all efficiency of the combination from a.c. line to the arc is only 36 to 37 per cent. (The smart theatreman, of course, would install a less capacious generator and not use the ballast, thus effecting a greater economy in operation.) Tests have shown that in some locations, depending upon power schedules, the bill for projection power may be reduced as much as $30 a month by changing from motor-generators to copper-oxide rectifiers.

Recent Developments in Projection Optics

Orthoscope System and Heat-Filtering Glass Top the New Advances in the Theatre Field

The application of hard, durable low-reflection films to the optical parts of motion-picture-projection lens systems is, without question, one of the greatest advances in optical science in recent years. Because of its significance in the optics world, and its inevitable adoption as standard practice by manufacturers of projection lenses, there is presented in these pages a complete account of the subject, in fact it is believed that this is the first truly complete and scientifically accurate account ever to be presented in a publication of this nature.

But the war years saw other developments* in the field of optics as applied to motion pictures and the theatre. Such will be discussed at this point, together with other pertinent information to promote a better understanding of the use and purpose of optical equipment.

MISCELLANEOUS CONSIDERATIONS

The constant cry on the part of the exhibitor has always been for two properties of projection lenses: (1) An image as free from aberration as possible, and (2) a bright image.

The first condition was gradually brought about by improvements of lens formulae. The second condition, however, was still not satisfactorily met until manufacturers of lighting devices hit upon new ideas, such as the high-intensity lamp.

Since the light output has a direct relationship to the size of the light source, the old, small, "quarter-size" lenses (with diameters between 1-11/16 and 2⅛ inches) became more and more incapable of taking advantage of the increased amounts of light available. This is the reason why the diameter of the modern lens is fixed around 2¾ inches, outside diameter.

As for the "quarter-size" and "half-size", these terms go back to the turn of the century, when projection lenses were specified not by focal length but by the extent to which a standard 8x10 plate was covered with light. This means that a half-size lens, theoretically, would cover a 5x8 plate and the quarter-size a 4x5 plate. In order for a projection lens to cover a 5x8 plate, it would normally be of a certain diameter, say three inches. As changes were made in lens formulae, it became possible to produce a lens whose diameter was not three inches but 1½ inches, and still covering the 5x8 size. The final result of these developments was that, instead of both these lenses being called half-size, since they covered a half plate, nomenclature degenerated to the point where barrel diameter alone was the governing factor. Thus, the first 3-inch diameter was half size, and the 1½-inch diameter lens was quarter size.

The trade has all but discontinued the use of this nomenclature, adopting instead the more optically accurate focal distance as the criterion of size. Anyhow, exhibitors now realize that lenses with larger diameters are required in order to make use of improved lamp equipment and to obtain brighter screen images.

Exhibitors sometimes ask concerning the longevity of a projection lens. This question can hardly be answered, for there is no way of accurately estimating the useful life, which is wholly dependent upon the care that it is given. Some lenses have been known to be ready for the junk pile after a mere six months in the hands of a careless operator, while lenses have been as good as new after ten or fifteen years of use by a skilled operator.

ORTHOSCOPE LENS SYSTEM

The new Orthoscope auxiliary lens system* consists of two high-precision elements, a negative and a positive, ground to individual theatre requirements, and highly polished. They are made of quartz to endure any amount of heat.

The Orthoscope might be called the "missing link", for the very important work it does. It replaces no part of the existing optical system, but is a supplementary set of lenses inserted between the light source and the film.

The mirror arc can do, and does do, a great job, but it has its limits. This can be readily understood, for at a glance you can see, by looking at a short focal-length objective lens and a long focal-length objective lens, a great deal of difference in the diameter of the rear lenses. Does it not stand to reason, then, that the mirror cannot fill each objective lens with light when they vary in size, as they have to, to meet different focal-length requirements.

This is where the new Orthoscope comes in. They are designed so that the correct curve is placed on them, in order that the light is placed evenly and directly on the film, and to fill the pupil of the objective lens with light, no matter what the diameter of the lens is. In filling an order for the new Orthoscope there is required the following information: type of lamp, name of machine, and the focal length, F value,

*Concerning some developments—such as, for example, the Garutso optical balance—editorial comment and discussion is withheld until such a time as the inventors and proponents of these devices either make a complete scientific disclosure or make a demonstration which is entirely conclusive to competant scientific and technical critics. Since these things have not been done, the eidtors have no alternative but to consider that there is no case.

*This material has been prepared by Hal Huff, exploitation manager of the H and H Optics' theatre division, through whose cooperation and that of the International Projectionist and the National Theatre Supply Division of National-Simplex Bludworth, Inc., the illustrations have been used.

TYPICAL OF THE PROJECTION LENSES perfected as the result of war research and development is the Snaplite Series II, shown here, of the Kollmorgen Optical Corporation. The new Series II Snaplite has been redesigned to produce increased illumination with a quality of image outstanding in contrast, definition, flatness of field, and freedom from color fringes. Speed of f/2.0 is maintained in all focal lengths up to 5 inches. Durable low-reflection coatings are regularly supplied. The rugged mounts are sealed for lasting trouble-free performance.

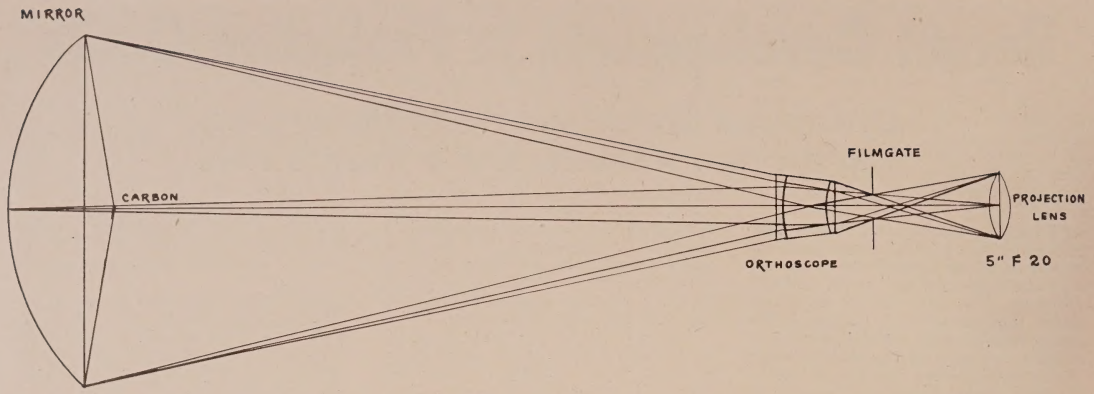


DIAGRAM OF THE OPERATION of the Orthoscope auxiliary lens system, reveals how the light is focused in front of the film. The negative (concave) lens picks up the light from the mirror and places it evenly on the positive (convex) lens, from which it passes through the film with equal brilliance from edge to edge.

To reduce the loss from reflection that four normal air-to-glass surfaces would introduce into the optical system, the two Orthoscope lenses have been given low-reflection coatings, which lets pass approximately 98 per cent of the incident light. Comparison before and after using the Orthoscope lens is very pronounced.

name, make of objective lens. With this information the Orthoscope is calculated to fill the above requirements.

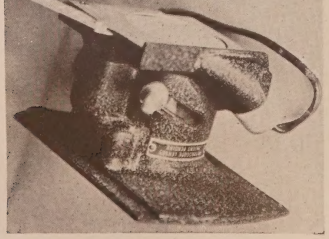
The accompanying sketch illustrates how the new Orthoscope focuses the light in front of the film. The negative lens has picked up the scattered light from the mirror and has placed it evenly on the positive lens, which, on the Simplex machine, is approximately 2 inches from the film. It might be assumed that the introduction of the two additional elements into the existing light beam would cause a considerable loss of light from reflection, because glass usually loses about 4 percent of light on each surface. Since the new Orthoscope has two elements it would appear that therefore a 16 percent loss of light would result. However, the Orthoscope is specially coated, reducing the loss of light to only 2 percent.

Now by focusing the light and after picking up a greater amount of the light rays from the light source, and by placing the light so as to completely fill the objective lens, the objective lens is in turn now performing a duty that it was originally designed to perform, but never did with proper success until the Orthoscope lens was brought forth. By filling the objective lens with light, the image changes from a square to a round image on the port hole glass, thus proving that the objective lens is completely filled with light.

The question of the proper amount of amperage needed to give the best screen results is an argument which has gone on for years amongst projectionists and theatre managers, and one in which the writer does not wish to become involved. However, an experience which may be cited is that of the Four Star Theatre in Los Angeles, California, a Fox West Coast first-run theatre. Their equipment consists of a Peerless Magnarc lamp, Super-Simplex machines with Bausch and Lomb Super Cinephor f/2.0 coated objective lenses and the new Orthoscope. The size of the picture is 21½ feet, with a 105 foot throw. Before installing the new Orthoscope lenses they were using 68 amperes with 7-8 carbons. Now they are using 6-7 carbons, using 42 amperes. The results are a brilliant, pleasing picure. The above illustration would indicate that it is not what amount of amperage is used so much as how it is used that counts.

These are some of the things the theatre gains by installing the new Orthoscope lenses. The screen is filled with more light from corner to corner, a bluish white light achieved by the removal of the chromatic aberration. This improves the black and white picture greatly, but the most noticeable improvement is realized in the showing of colored pictures. The true colors stand out as if they were hand-painted. The audience can view the picture from any seat in the theatre with pleasing results, since distortion has been reduced to a minimum, the picture shows a great depth of focus, which gives a third dimensional effect, making the characters seem alive.

FOR THE SIMPLEX E-7, this is the Orthoscope lens holder that has been devised by H and H Optics. Installation is very simple: All that is done is to remove the spot-sight box and insert the Orthoscope.



VIGNETTING FILTER

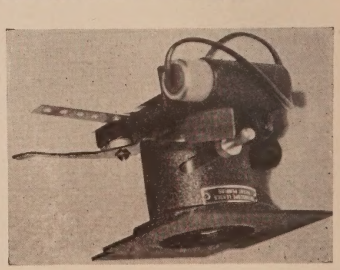
The transparency of very thin sections of stainless steel has solved one of the serious problems in aerial reconnaissance and map-making.

For certain types of aerial photography, cameras are equipped with wide-angle lenses, a battery of three such cameras making possible the photography of all terrain from horizon to horizon. An inherent property of such wide-angle lenses is the "hot spot" in the center of the field, which resulted in pictures which were bright in the center but dark at the edges.

To correct this fault, engineers of the Bausch and Lomb Optical Company developed a vignetting filter, to be installed in front of the lens. This filter consists of a disc of optical glass on which a film of stainless steel is deposited by a special electrovacuum process, not unlike that employed in coating lenses. The film is thickest, and transmits the least light, at the center of the disc; it becomes gradually thinner and more transparent toward the edge; thus it eliminates the hot spot. By complementing the characteristics of the photographic lens with which it is used, the vignetting filter permits photographs of the ordinary density distribution.

While this vignetting filter could be used in conjunction with a projection lens, if that lens yielded a hot spot on the screen, Bausch and Lomb does not find it necessary in either its Cinephor or Super Cinephor projection lenses. These are designed to produce uniform illumination of the entire screen so that the filter would not have much use. If however, exhibitors do have difficulty with lenses which do create hot spots,

FOR THE SUPER AND STANDARD SIMPLEX, this Orthoscope lens holder has been designed. The auxiliary system is tailor-made to every theatre's own requirements. National Theatre Supply is the seller.



Bausch and Lomb states it would be possible to use a vignetting filter to reduce the illumination.

NEW HEAT FILTER

Improved projection of color pictures and cooler working conditions for motion-picture and television actors are made possible by a new heat-absorbing, color-transmitting glass announced by the American Optical Company. The new glass, when used as a heat screen in a projector, permits the projection of motion and still pictures in their original colors, thus permitting pictures to be reproduced on the screen just as they were taken.

The glass absorbs heat emitted by the light source, so that films and slides are protected against burning. This insulating property enables film editors and educators to study a specific projected scene by stopping the projector and relying on the glass to protect the film. The glass can also be used in spotlights and floodlights as a heat screen to protect motion-picture and television actors against burning. This insulating property enables film editors and educators to study a specific projected scene by stopping the projector and relying on the glass to protect the film. The glass can also be used in spotlights and floodlights as a heat screen to protect motion-picture and television actors against the scorching heat generated by the powerful lights. Approximately 90 per cent of the present almost unendurable heat is absorbed by the glass. Development of the glass makes possible improved, safe, color projection on an extended scale in homes, schools, theatres, and stores.

"The new glass," Dr. Edgar D. Tillyer, American Optical's research director, explained, "absorbs approximately 90 per cent of the infra-red (heat) radiations and transmits approximately 85 per cent of the light out of a possible 92 per cent (8 per cent is generally lost by reflections) If reflections are reduced by glare-removing methods, light transmission can be increased from 85 to 90 per cent. The glass transmits colors accurately, is chemically stable, resists weathering without requiring a surfacing treatment, and can be molded, ground, polished and fabricated like ordinary glass. It is formed from carefully balanced proportions of phosphorus, aluminum and silicon oxides, supplemented by various conditioning ingredients, together with ferrous iron as the heat-absorbing agent."

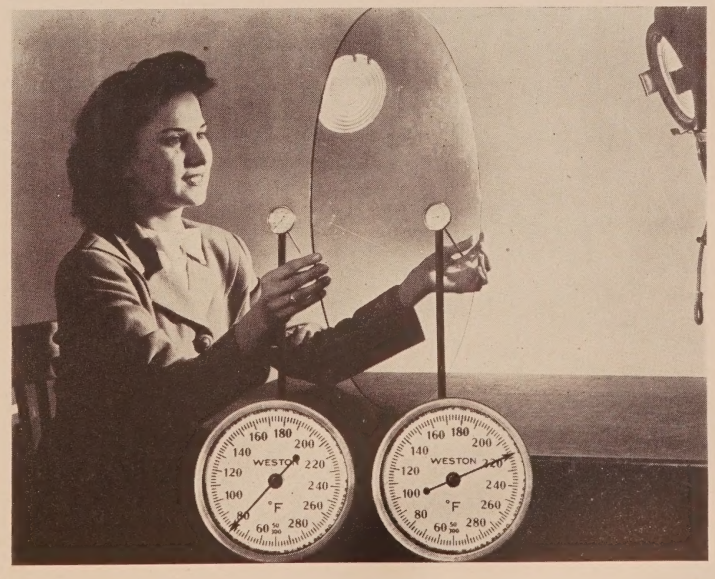
The story behind the new glass, as revealed by Doctor Tillyer, is another example of American scientific ingenuity triumphing over reputed German superiority in glass development. Prior to the war, heat screens for color picture projectors were generally imported from Germany. Although relatively efficient light transmitters, they were chemically unstable and had to be given a special surfacing treatment by their manufacturers to make them resist weathering. Furthermore, they could not be worked like conventional glass. At the outbreak of the war, it became impossible to continue importations of the glass. In view of its importance, technologists intensified their development of new heat screens and finally perfected this composition that is superior to the German glass.

DR. E. D. TILLYER, American Optical's research director, demonstrates how the new heat-absorbing, color-transmitting glass protects a film or slide against heat emitted by the light of a projector. Despite a protective shield of ordinary glass placed before it, the film in the right pedestal bursts into flames while the film in the left pedestal, protected by a piece of the newly developed heat absorbing glass, survives without damage.

REFLECTORS AND MIRRORS

Basically, a mirror consists of a piece of clear glass on which a layer of metallic silver has been deposited. The silver reflecting surface is actually on the back side of the glass as one looks into it and is covered with a protective backing to preserve the finish.

IN ADDITION TO IMPROVING the projection of color pictures, the new glass can also be used as a heat screen in spotlights and floodlights to protect movie and television actors from scorching heat generated by the powerful lights. This picture demonstrates how the glass absorbs heat emitted by the floodlight (upper right). A thermometer placed between the glass and the source of heat registers a temperature of 220 degrees, whereas the other thermometer, behind the heat-absorbing glass, registers only a relatively chilly 80 degrees Fahrenheit.

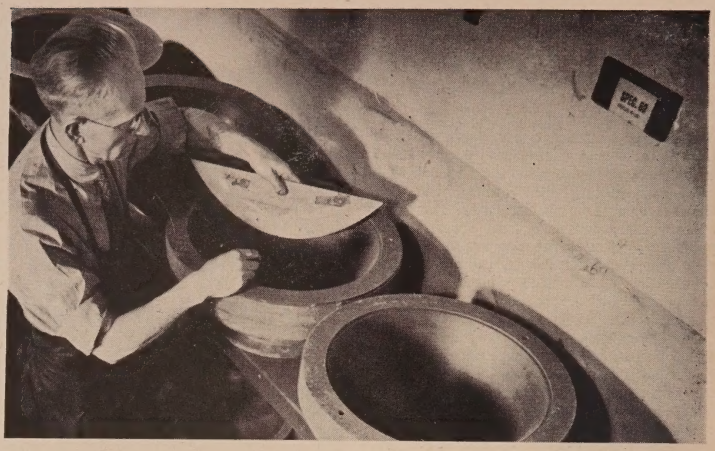


Reflector Manufacture

The design of an elliptical reflector as used in motion-picture projection, requires a staff of skilled technicians to compute the exacting physical and optical requirements necessary to pick up the light from the positive arc crater and focus the light at the film aperture. Gauges are developed to these predetermined computations and the actual glass forming molds are accurately ground to match these master gauges.

Actual production of the reflector begins in carefully selecting the flat glass which is then cut into round discs. This flat blank is carefully edged and rough ground. The circular disc of flat glass is then placed over the concave forming mold, after which the mold is placed in the bending furnace where it is rotated while the glass is heated to the softening point where it is sucked down by vacuum to make perfect contact with the optically ground and polished surface of the mold. After the forming operation is completed, the mold is removed from the furnace and the glass blank dumped from the mold.

The formed glass is then transferred to the annealing lier wherein it is cooled slowly and uniformly to assure freedom from strain. During this cooling process, the reflector blank travels on a conveyor belt until it emerges at the other end of the oven at room temperature. The curved reflector blank is rough trimmed, following which the center hole is cut out with a diamond tool.



REFLECTOR-MAKING STARTS with the preparation of the actual forming molds. Gauges developed to predetermined computations are accurately ground to match the master gauges shown here. All pictures of reflector manufacture are used through the courtesy of Harry H. Strong and the Strong Electric Corporation, with the textual material compiled from that company's recent brochure on reflectors and from other authorized sources.

A finished grinding operation follows, in which the reflector is edged to exact size and concentric, then the front edge is ground flat to assure accurate optical placement. To facilitate handling during polishing operations, the reflector blank is secured or blocked within a metal shell by means of melted pitch. This shell containing the reflector is transferred to a power polishing machine where both surfaces are polished, with periodic inspection, until the required optical surface is attained. Hand finishing and inspection follow.

In the next operation, the optical blank is chemically cleaned. Further inspection follows in anticipation of etching into the glass the trademark and serial number of that particular reflector.

All of these operations are quite mechanical and merely determine the final design and appearance of the mirror. To prepare the glass for the actual silvering operation, it is thoroughly washed with a paste of rouge and washing powder to eliminate last traces of dirt and grease that may have accumulated in handling. The glass then is rinsed with copious quantities of water to insure a surface most receptive to silvering.

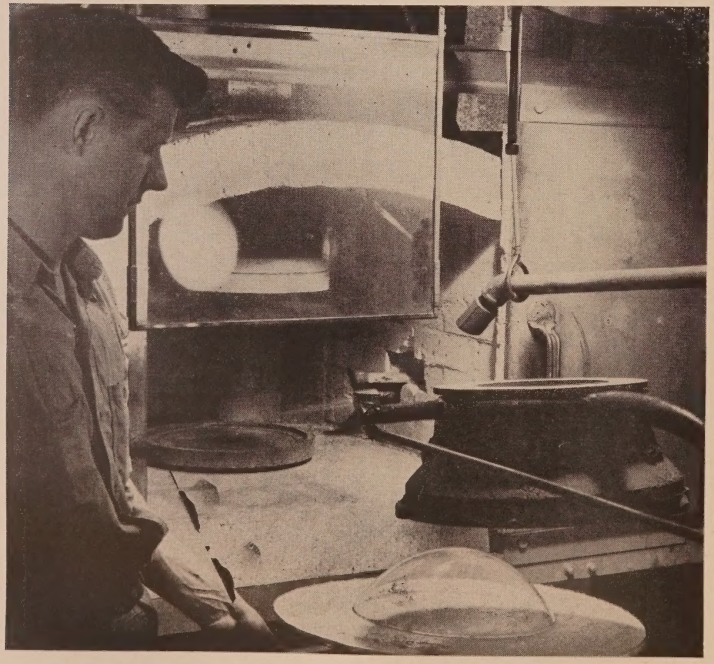
The silver coating generally is prepared by reducing an ammoniacal solution of silver nitrate with any one of several reducing agents. A common production technique is to arrange the glass on a perfectly level table in such a manner that the solutions can be poured over the surface and allowed to stand for a period of time sufficient to completely deposit the silver. A more rapid and efficient method is where the solutions are sprayed on the glass with specially designed spray guns.

For projection reflectors, the silver is deposited by a continuous flow of the silvering solution on the back of the mirror, so as to form a uniform and brilliant reflecting surface.

The solutions of both the reducing agent and the silver salt are prepared with particular care to insure their stability over the period that they are stored.

After the silver deposit has been formed on the glass, all traces of the remaining soluble salts, which later might react with the silver finish, are removed by a battery of rinse sprays.

THE ROUGH SHAPED BLANK is molded under heat from a flat sheet of glass. In the bending furnace, seen in the background, the mold is rotated while the glass is heated to the bending point and, through suction, sucked down into the mold to make perfect contact with the optically ground surfaces of the mold. From this point, the formed blank is annealed, rough trimmed, the center hole cut out, finished ground, polished. It's now ready for silvering.



To protect the silver, the reflector receives a heavily electroplated coating of copper, after which the back is sprayed with several coats of the familiar backing which is slow baked at a low temperature to extreme hardness.

The reflector is carefully cleaned, and wrapped.

The results of the optical tests for each individual reflector are then recorded according to the serial number etched thereon and these records are kept in the engineering department for future reference. The test records on the thousands of reflectors now in service are on file. These files contain the specifications of over 200 types and sizes of reflectors, as required in the various types of projection lamps.

The Status Quo

The modern technique, by which hard, durable coatings of transparent materials can be produced has given impetus to the idea of new procedures in mirror manufacture, as well as to resurrecting the old idea of using thin films to protect front-surface reflectors from corrosion and abrasion.

It is apparent, then, from the discussion of lens coating and transmission films, that films, having a lower refractive index than the glass upon which they are deposited, cause a decrease in reflection. If the film has a refractive index greater than the glass, reflection is increased. Zinc sulphide is colorless and stable and possesses an index of refraction of 2.35. When a film of this material is formed upon glass having a refractive index of 1.52, it is possible to increase reflection from the normal 4.2 percent to as high as 53 percent. Here, then, is a method for making highly efficient and non-absorbing mirrors. The time is not far distant when these mirrors and semi-reflectors will completely displace the inefficient ones now made of metal.

What is urgently needed is a front-surface reflector having the corrosion resistance, durability, and hardness of rhodium, coupled with the high reflectance of silver. The thought has been that a thin, impervious layer of transparent material could be deposited upon the silver to protect it from tarnish. The same idea has been applied to aluminum to increase its resistance to the corrosive action of salt-water atmospheres and to permit easier cleaning without scratching. The results to date, however, have not been satisfactory.

Undoubtedly, the most perfect reflecting surface is that which makes use of internal reflection. No film is required and the reflection is 100 per cent perfect. The designers have demonstrated great ingenuity in devising intricately-shaped pieces of glass to utilize this most perfect type of reflection for conserving light while changing direction and inverting images.

Many cases arise, however, where it is impossible to use internal reflection and recourse must be found in the next best source of reflectors, the metals. Except for sodium and potassium—excluded because of their chemical activity—silver, aluminum, and rhodium are the only ones which are being used to any great extent as reflectors.

Of these, silver is by far the best, its reflectance being about 96 percent when used as a back-surface reflector. It can also be deposited from chemical solution upon polished surfaces to give flawless mirrors. Silvering by chemical means has been for years the standard method of making mirrors and reflectors, irrespective of whether they are to be used in precision optical instruments or are to be hung on the walls at home.

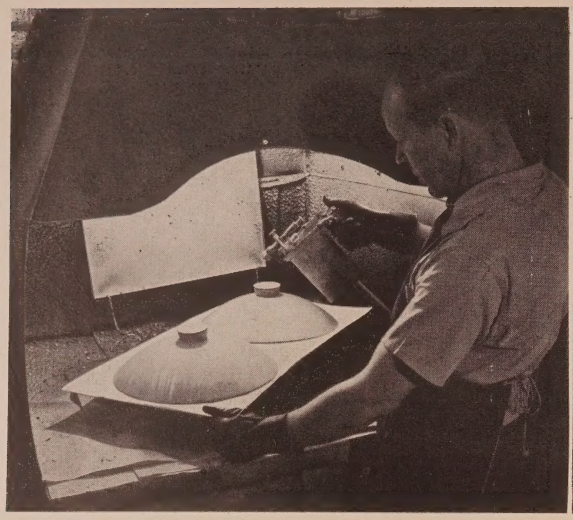
Unfortunately, an exposed silver surface tarnishes rapidly, so that its reflecting power is destroyed. Silver, therefore, is always used as a back-surface reflector and the unused surface covered with other metallic coatings and protective paints. It is indeed unfortunate that silver tarnishes so readily, because the design of optical instruments is unduly complicated, and materials having inferior reflective power must be used as front-surface reflectors.

Aluminum, second to silver in reflecting power of all the known useful metals, can be used as a front-surface mirror. It has been used as the reflecting suface of astronomical telescopes for several years because of its non-tarnishability and retention of reflecting power. Its reflectance, however, is only 89 percent, and this low figure excludes it from use in instruments which must have the highest possible transmission. Its softness, which introduces difficulties in cleaning with scratching, and its susceptibility to rapid deterioration in salt-water or salt-water atmosphere further restricts its use to enclosed locations where it is protected from mechanical abuse and atmospheric conditions.

The need for a front-surface reflector which is very hard and possesses excellent resistance to abrasion and chemical corrosion has been found in films of metallic rhodium. The result has been obtained at considerable sacrifice of reflectance, however, for 75 per cent is about the maximum. Rhodium plating of metallic objects came into commercial use ten to fifteen years ago, but its application to optical elements was largely a development of the wartime years. However, for some time Heyer-Schultz, Inc., had been making an all-metal, rhodium-plated reflector for motion-picture projectors.

Rhodium is also used as the reflecting surface in large searchlights, because of its hardness and resistance to corrosion.

THE SILVER IS DEPOSITED by a continuous flow of the silvering solution (frequently with ammoniacal silver nitrate as the base) over the backs of the reflectors so as to insure a uniform and brilliant reflecting surface. Following the silvering, the reflector receives a heavily electroplated coating of copper to protect the silver from scratches and other forms of physical damage and to prevent the tarnishing of an exposed silver surface.



A FINAL SPRAYING of the familiar white finish is sprayed in several coats and slow-baked to extreme hardness. To prevent the spray from getting on the inner surface of the reflector, the center hole is plugged during this process. Next come the final tests of the complete reflector, cleaning and wrapping, and it is finished.

CAREFUL CLEANING of the reflector, prior to wrapping, is the last step in the manufacturing process. All reflectors carry a serial number, and the engineering department keeps complete files and records on all tests made with each reflector. The serial numbering and trade marking is done just before the silvering process.

The rhodium is electroplated upon the surface after the latter has been formed to the proper curvature.

Thin transparent films of platinum have been used to a limited extent as semi-reflectors or beam splitters. Thin films of gold have been used for the same purpose in three-color cameras.

Other metals—such as copper, stainless steel, chromium, and beryllium—have been tried for various purposes, but their use has never become widespread.

During the war a searchlight reflector was made from Haynes Stellite, a development of the Electro Metallurgical Company. The material—an alloy of cobalt, chromium, and tungsten—takes a high polish and is said to be so hard and corrosion-resistant that the reflector surface is not marred by salt air, the heat of the arc, nor the constant use of nitric acid in cleaning it.

In retrospect, it is apparent that no developments of a startling character or far-reaching importance have been made with respect to metallic films for mirrors. Silver still retains its position of preeminence, far outdistancing its nearest competitor, aluminum, in quality and quantity. Methods of manufacture are the same as have been used for years.

INSPECTIONS, MANY OF THEM, from the beginning to the end, insure optically perfect reflectors for the motion-picture theatre. The inspection shown at the left is that which follows the polishing of the glass reflector shell, and reveals any flaws in the glass brought out in the polishing process. The inspection and test shown at the right is the final one in which the finished reflector is checked and rechecked to insure optical accuracy of the curvatures. The accuracy of the curvatures and the perfection of the optical glass all play important parts in insuring the theatre man that he will have the best results from his carbon arcs.

Lenses Improved by Low-Reflection Films

Perfection of Process for Coating Lenses A Great Development in Projection Optics

Lens coating, perhaps one of the great optical developments of the past half century, is bound to be more and more an important factor in the making and showing of better motion pictures. Basically the idea is to treat a lens by special means to allow more of the incident light to pass through the optical system and thus put more usable light on the film in the camera and on the screen in the theatre. This effect is attained by means of coatings, referred to as low-reflection films, since the essential property of the films is that very little light is reflected. The term transmission film* is also used, because, by reducing the reflection, the transmitted light is increased. However, on the theatre supply shelves, projection and camera lenses provided with such films will probably be referred to as plain "coated lenses."

THE NEED FOR "INVISIBLE" GLASS

It is a matter of common knowledge that the clean surface of a piece of glass is a rather good reflector—and the polished surface of a lens is no exception. Regarded from the viewpoint of light economy, the reflections from a lens are highly undesirable, since the light which is reflected is obtained solely at the expense of the transmitted beam, thereby weakening it.

The amount of light lost when it strikes a glass surface increases with the refractive index (roughly a measure of density) of the glass. For ordinary window glass, the loss is 4.2 per cent at each surface and for the heavier flint glasses, it may amount to as much as 7 per cent for each surface passed.

The reflection, of course, at a single lens surface may not be of much consequence, but the cumulative effect with many surfaces may become extremely high. To illustrate, consider a standard 7 x 50 prismatic binocular, in which the light crosses boundary surfaces ten times in its passage through the instrument. The transmission is approximately 55 per cent, the other 45 per cent being lost by absorption within the glass, and reflection at the ten air-glass surfaces. Although only about 12 per cent is accounted for by absorption within the glass itself, the remaining 33 per cent represents the total of all reflection losses. Many complicated optical systems often involve twenty or more air-glass surfaces, and even the usual motion-picture projection lens—like the Bausch and Lomb Super Cinephor, has eight air-glass surfaces.

Optical engineers have, of course, long been aware of these losses, but the reduced transmission had generally been accepted as a necessary evil, since corrective measures were not known.

Attempts to reclaim a major portion of this reflected light by preventing its formation have only recently been sufficiently successful to warrant commercial application. And the solution was quite simple: Merely put a new surface on the glass!

The great amount of publicity that lens coating received five or six years ago was doubtless due in a large measure to its importance in the optical field. But it must be granted that this was aided by the perhaps unfortunate (but nonetheless appealing) popular appellation of "invisible glass."

Under ordinary conditions, of course, there is really no difficulty in seeing a piece of "invisible" glass, and hence, the nickname ought now to be dropped, for it has outlived its purpose in the popularization of the subject. It seems best to speak simply of surface-treated glass or of glass provided with low reflection or transmission films, since the treatment to increase transmission consists in providing the glass with a surface film of definite characteristics.

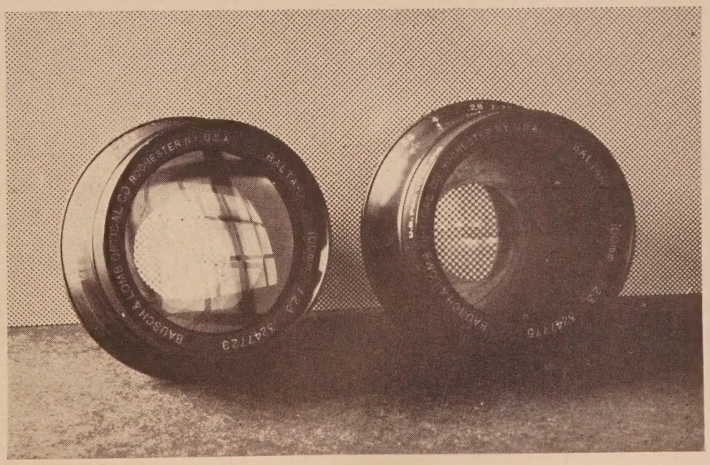
WAYS AND MEANS

There are now known several methods of obtaining low-reflection films on a lens or other glass surface, among which are (1) leaching; (2) by building up a film of successively-applied monomolecular layers of certain metallic soaps; (3) by thermal evaporation of a salt, generally a fluoride, in vacuo, and allowing the vapor stream to condense on the optical surface; (4) by chemical deposition from a bath or application directly to the glass; and (5) by etching the surface of the glass with the vapor of hydrofluoric acid. The subject of filming is so active, however, that further methods may be expected to be announced.

Historically, the chemical treatment of surfaces is oldest, dating back to 1892, when the English lens designer, H. Dennis Taylor, observed that lenses which displayed the tarnish produced by weathering actually had less reflection loss than freshly polished lenses. While this observation was contrary to popular, prevailing opinion, Taylor demonstrated that the tarnish was a benefit and not a detriment, and showed experimentally that an artificially accelerated weathering effect could be induced by applying chemicals and that lenses so treated have less than normal reflection.

Taylor's observations were buried in the scientific literature of optics until 1916, when the idea of chemically leaching certain kinds of glass was resurrected and made the subject of further investigation by Frederick L. G. Kollmorgen, who before he became vice-president of the Kollmorgen Optical Corporation in 1915, had been associated with Cark Reichert of Vienna, Ross, Ltd., of London, and Keuffel and Esser of Hoboken, serving all as an expert optical adviser.

COATED AND UNCOATED LENSES side by side show clearly the advantage to be obtained from adding low-reflection films at the air-glass boundaries. Here are seen two Baltar camera lenses, the uncoated lens on the left, the coated on the right. Note particularly how, with the ordinary lens, the reflections almost prevent one's being aware of the background, while with the coated lens the details are seen. (Bausch and Lomb photograph.)



* The terms "low-reflection film" and "transmission film" are used synonymously, with, however, the prevailing usage inclining to the former term as the one more accurately expressing, optically, the function of the film. However, decreasing reflection by any of the means herein described naturally increases the transmission.

Despite further extensive experimentation in 1918 by Dr. Fred E. Wright, then and now petrologist of the Carnegie Institution's Geophysical Laboratory, the process fell into oblivion again following World War I. However, both Doctor Kollmorgen and Doctor Wright correctly foresaw the application to military instruments, applications which future research and World War II should bring into being.

The modern leaching method applicable to most glasses involves immersion in dilute mineral acids (such as nitric and hydrochloric acids) at elevated temperatures and for periods of time depending on the type of glass. This method, while producing very hard films, has never been used to any extent because it is inferior to method (3)—evaporation of fluorides—in reducing reflection.

The second method for adding films to optical surfaces—the building up of monomolecular layers of certain metallic soaps—an outgrowth of the researches of General Electric Company's great Dr. Irving Langmuir—is the particular contribution of Dr. Katherine B. Blodgett, research physicist since 1918 at that company's Research Laboratory.

The fundamental procedure is essentially this: The glass to be coated is dipped into a solution on the surface of which the coating material is floating as a monomolecular layer. When the glass is dipped into the solution and then withdrawn, the coating material is transferred to the glass surface as a monomolecular layer. Thus, it is necessary to dip the glass many times in order to build up a surface of a desired thickness. A subsequent treatment, analogous to chemical leaching, alters the structure of the film so that a film of low refractive index is formed. This method has never been used in practice because the films are too soft and fragile, but a study of the properties of such films has been of great academic interest.

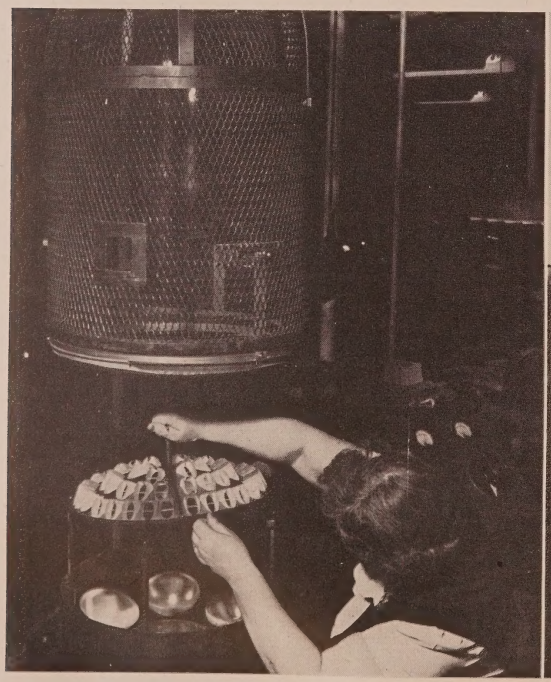
The third method of applying transmission films to glass—the deposition of certain metallic salts on optical surfaces—was proposed about 1936, by Dr. John Strong, of the California Institute of Technology. He demonstrated that reflection losses could be reduced considerably by covering the glass surface with a very thin layer of material having a low refractive index. The Strong method was to evaporate calcium fluoride in a high vacuum. The vaporized fluoride, streaming out in all directions within the vacuum chamber, was deposited as a thin film upon all surfaces in its path. This is the method which was used almost universally throughout the war period during which hundreds of thousands of optical elements were coated.

A fourth method, involving the deposit of a coating from a bath, has been developed by the American Optical Company, a project with which R. H. Moulton, assistant director of research, has been prominently associated. The method utilizes spinning of the elements to be coated at very high speeds and under exact conditions of temperature and humidity. As the elements are spun, a solution containing the coating material is dropped to the plane of rotation and, through centrifugal force and surface tension, a layer of the proper thickness is spread over the optical parts. A variation of this procedure, for use with flat glass, is to raise the glass from the bath at a slow, regulated rate, so that the liquid can drain off and leave a uniform coating. This method was developed too late to be of much service during the war but it may assume a more important role in the future.

The last method is one which has been developed by the Radio Corporation of America. Certain glasses are treated with hydrofluoric acid vapor of low concentration which acts to form, quite contrary to expectations, a surface layer of sponge-like and porous silica. This process is somewhat analogous to the leaching process described above, in which certain components of the glass are removed and the silica remains. This method, as in the preceding, may become important in future application but did not play an active part during the war.

Credit for the earlier commercial process should go, in a large measure, to the researches at the Massachusetts Institute of Technology of Dr. C. Hawley Cartwright presently at the California Institute of Technology, and Dr. A. F.

THE METHOD OF COATING LENSES is briefly pictured here. The optical parts are placed in a rack (left) and placed under a belljar. When the air is exhausted and the proper degree of vacuum has been obtained, magnesium fluoride is evaporated within the chamber. As the chemical, in a gaseous form, streams out in all directions, a portion is deposited on the optical parts in the rack. By watching the light reflected from the optical parts change color (right)—the changing color being an index of the thickness of the coating—the process may be terminated at the moment the film becomes a quarter-wavelength thick. By strict attention to the length of time, the degree of temperature, and the amount of vacuum, the modern, hard low-reflection film is obtained. (Bausch and Lomb photographs.)



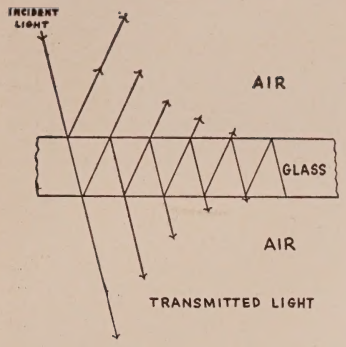


FIGURE 1.—Light striking the surface of glass sets up an infinite series of reflections within the glass itself, as shown here. The more incident light that is reflected, the less there is to become transmitted.

Turner, now staff member of the Bausch and Lomb Optical Company.

The transmission films produced by Doctor Cartwright and Doctor Turner possessed sufficient durability combined with optical efficiency to make them suitable for some commercial applications. While they did not fare too badly in spite of the normal abuse and other encounters of military parts, a still higher degree of durability was deemed necessary for the purposes of the Army and Navy.

After considerable research and experimentation in the Optical Shop of the Naval Gun Factory, Dr. Dean A. Lyon perfected an improved heat treatment for the magnesium fluoride films which was more convenient, economical, and efficient than the previous baking procedures and resulted in an evaporated film which was far superior to any then known.

The Lyon method was successful—and, being acceptable to the Armed Services, the process was made available to all companies engaged in making optical instruments for the Services.

The Lyon method in brief comprises the heating in a high vacuum of the optical parts to be coated. When the desired temperature is attained, magnesium fluoride, in a crucible in the vacuum chamber, is evaporated by the heat of a small electric coil immediately above. By attention to the conditions of time, temperature, and vacuum, the hard film is obtained on the optical elements.

Thus, a new commercial process came into being which, in three short years, has grown into a thriving new industry having a capital investment of several million dollars.

PRINCIPLES OF REFLECTION

In determining where reflection will occur, it is an inflexible law of Nature that light will be reflected whenever the light goes from a glass of one optical density into a glass of a different optical density. Since the "index of refraction" is a measure of the optical density, it follows that light will be reflected wherever the index of refraction changes. It does not matter whether this change of index takes place gradually or occurs suddenly—as at the surface of a piece of glass. Since homogeneous, transparent materials—such as glass, quartz, liquids, etc.—in contact with each other or with air are practical cases, the index of refraction changes suddenly at the boundary surfaces and is the only case which needs to be considered.

Since a change in index is the condition necessary to cause reflection, it follows that reflection will occur if light goes from a less optically dense into a more optically dense (transparent) medium, and vice versa. Reflection will therefore occur when light goes from air (index equals 1) into glass (index equals 1.51 or more) and also when the light goes from the glass into the air.

Theoretically, every reflection, except the very first, gives rise to an infinite series of reflections, as indicated in Figure 1 for a single sheet of glass.

Referring to Figure 2, it is reflection B plus the minor part represented by the multiple reflection which cancels reflection A. Similarly, reflection E plus the minor part presented by the multiple reflections cancels reflection D.

If there is optical contact between the two pieces of glass, the reflections reduce to a single one (C, in Figure 2). No matter how perfect this contact, a reflection will always exist because light goes from glass 1 of index V to glass 2 of index W, or vice versa. If the indices of the two glasses are identical, then no reflection occurs, as it is equivalent to a single thickness of glass. In order to eliminate the reflection at the cemented surface for any specified wavelength, the cementing medium (balsam or resin) would have to be one-quarter wavelength thick and have an index of refraction equal to the square root of the product of the two indices of refraction. In practice, no effort is made to attain these ends, because the reflection at the cemented surface is small and inconsequential.

Thus, it is seen how, when light strikes a plate of glass, it is slowed up and a portion of the energy fails to penetrate the surface. The surface of the glass acts like a bump and, in passing over it, some of the energy of the light is jarred loose, and goes to form a reflected beam. Now, it seems plausible to try smoothing out this refractive-index bump, by letting the light penetration take place in steps. Over the surface of the plate of glass is placed a layer of special material of lower index. Then the initial loss at the new surface will be lower than if the light struck the bare surface of the original plate directly, because the index of the new surface is smaller. Of course, there has been added a new reflecting surface—the inner face between the surface layer and the plate—but it turns out that the combined light loss at the two surfaces is less than the light loss by one reflection from the bare surface of the untreated plate if the film thickness is properly chosen.

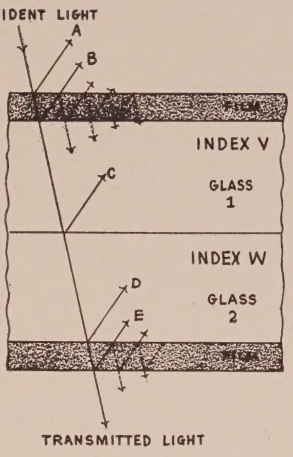
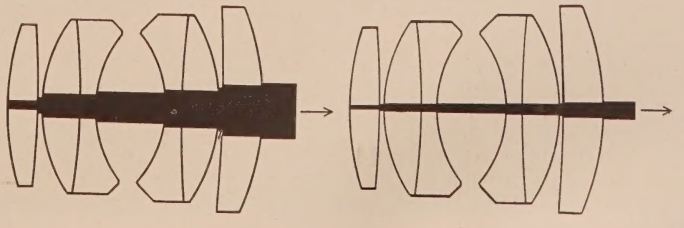


FIGURE 2.—While, with coated glass, reflections do occur (compare Figure 1), certain pairs of reflections, being half-way out-of-phase, cancel. Thus reflections A and B being canceled, as are D and E, thus, there is an increase in the amount of transmitted light.

Even though complete extinction of reflection cannot be obtained, the practical results are remarkably good. Using magnesium fluoride, a crown glass (alkali-lime glass) having a refractive index of 1.52 will have its normal reflectance of 4.2 per cent reduced to 1.3 per cent. A dense flint glass (heavy, brilliant glass containing lead), with an index of refraction of 1.65, will have its normal reflection of 6 per cent reduced to 0.6 per cent.

The maximum sensitivity of the eye lies within the wavelength range between 510 and 555 millimicrons, the lower value (the blue end of the spectrum) being reached when the eye is dark-adapted and the higher value (the red end) when it is adjusted to the high-level illumina-

THE LIGHT LOSS DUE TO REFLECTION at the air-to-glass surfaces in a Cinephor lens without (left) and with (right) low-reflection films is graphically shown. The width of the black band, as it increases, passing through the lens from left to right, indicate the cumulative loss of light. Note that there is an increase in light loss at every air-to-glass boundary and how coating greatly reduces the loss. (Bausch and Lomb photograph.)



tion. In actual practice, therefore, film thicknesses are adjusted so that maximum efficiency in reducing reflection also occurs within this same wavelength range.

The question is often asked why a reduction in reflection necessarily means an increase in transmission. The explanation is that light is a form of energy, and, since energy cannot be destroyed, an accounting must be made of all of it. Since there is negligible absorption and scattering in the film, the energy which no longer appears as reflection must, necessarily, appear as an increase in transmission.

LOW REFLECTION

No matter how the films are applied, the basic principles of their behavior remain the same. The present transmission film is commonly made of magnesium fluoride, this particular material having been chosen because its films can be made hard and durable and they will retain these properties in service. Other substances are known which are more efficient in reducing reflection, but they lack some essential mechanical property.

Naturally enough, the haphazard application of a film to a glass surface can scarcely be expected to produce the best results in decreasing reflection. From an optical point of view, a transmission film may be characterized by two quantities: by thickness and by refractive index. Each of these quantities has a single best-value for the purpose at hand. Disregarding the index for a moment, the question arises just how thin film may be and be most effective. The rather startling answer is, practically speaking, about four millionths of an inch! The reason for this lies in a powerful optical phenomenon which becomes prominent: the interference of light.

It can be shown mathematically that, if the optical thickness of the film is made equal to one-quarter of the wavelength of the light to be eliminated, then the reflection from the glass-film boundary will be 180 degrees out of phase ("out of step," that is) with the reflection from the film-air boundary, and then the destructive interference will result. If the amplitudes of the two reflections are equal, then complete cancellation of the reflection takes place. The film is, therefore, a way to split the incident beam into reflections which cancel each other.

Just how thick is a quarter-wavelength film? A relative example shows that if a filmed glass 1/16 inch thick were magnified to appear as thick as Mount Washington is high (6,293 feet), then the quarter-wavelength film would show as a four-inch snowfall on the mountain top!

MULTILAYER FILMS

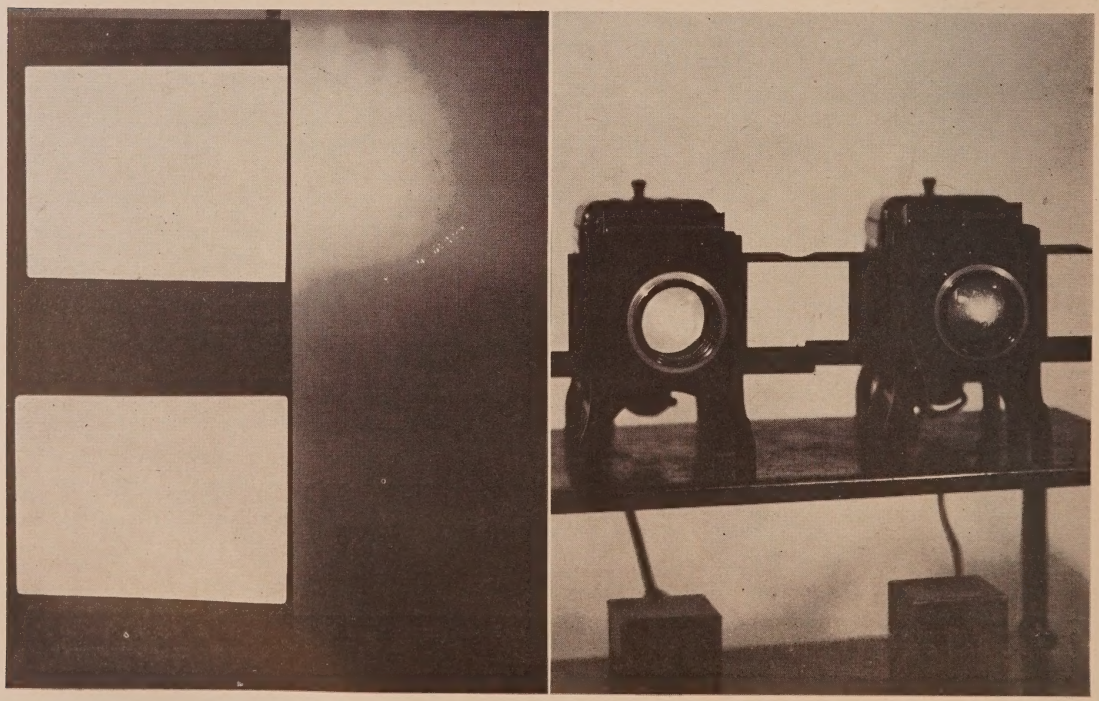
Thus far, single-layer films only have been discussed. It was stated earlier that materials having sufficiently low refractive indices to give complete cancellation of reflection were not available. Would it not be possible to approach the problem from another direction, and, by some artificial means, to increase the effective index of refraction of the glass, so that the theoretical relationship could be satisfied in practice? Yes, for when reflection from an optical element is increased by the application of a thin film having a refractive index greater than that of the glass, the result can be interpreted as equivalent to an unfilmed glass having a higher refractive index. Hence, zero reflection at any specific wavelength can be realized if the glass is coated first with a high-index material to increase the reflection and then a second film of low-index material is applied to cancel the reflection. Theoretically there is an infinite number of combinations which will give zero reflection, but the number of materials which have the required mechanical and chemical properties is severely limited.

The intensive research now going on will undoubtedly lead to the development of a satisfactory double-layer film which can be used industrially.

WHITE LIGHT

In the foregoing it has been more or less assumed that the low-reflection films are operating in monochromatic (one-color) light, which, however, would be

AN ILLUSTRATION OF THE INCREASE IN CONTRAST obtained by using low-reflection films on projection lenses is shown here. The projectors (right) were identical, except that the lens of one had been provided with transmission films. A small rectangular aperture was projected with each and the projection screen photographed (left). The untreated lens produces a diffusely lighted background due to illumination of opaque portions of the slide by misdirected light originating at the lens surface. The treated lens leaves the background black (because lens coatings eliminate reflections), enhancing contrasts. (Bausch and Lomb photos.)



more the exception than the rule. White light brings with it minor complications. Whereas a transmission film, which will flatly refuse to reflect light of one particular wavelength, can be made, such a feat is impossible for the wide range of wavelengths in white light. At least, it is true with the type of films presently under discussion.

The reason for this lies principally in the inability of a film to fulfill the quarter - wavelength requirement for more than a single wavelength. The optical thickness of a given transmission film is correct for only one position in the spectrum, and it is for this wavelength that the reflectance of the film surface is a minimum. Neighboring wavelengths show a progressively increasing reflectance as the departure from the optimum becomes greater. This preferential reflectance from a filmed surface tints the reflected images formed by it, and in this sense the film "looks" colored. The particular "tint" is indicative of the film's thickness.

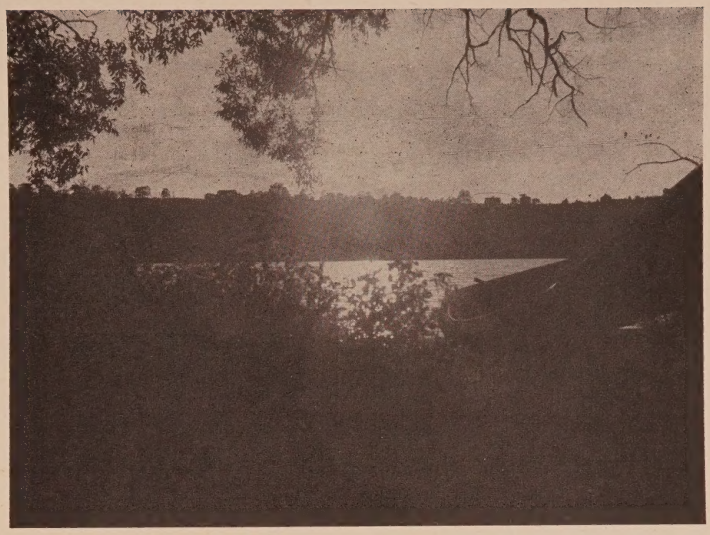
The phenomenon is easily understood if the process of reflection is visualized as the film builds up. When the film is thin, it shows a minimum reflection in the violet, so white light reflected from this film is deficient in violet and, consequently, appears brown. As the film thickness increases, the position of the minimum reflectance wanders toward the longer wavelengths. When it has arrived midway in the green, the reflected light becomes a magenta, and when the minimum is in the red end of the spectrum, the film appears to be blue. These color changes are so marked that color gauges have been devised for determining the thickness of the films. The usual commercial practice is to control the film thickness visually with a small hand-held fluorescent light. At the Radio Corporation of America, however, an electronic control has been devised.

However, this tinting effect which is so apparent in reflected beams, is so weak in transmitted and projeccted beams that it is, for the ordinary eyes, not observable, either in black-and-white or in color photography. Indeed, the first coated Super Cinephor lenses made for motion-picture projection by Bausch and Lomb in 1939 were used on all showings of the Technicolor production "Gone with the Wind." The lenses are coated to give maximum transmission in the greens; this mid-point in the visible spectrum—coincident with the region to which the eye is most sensitive—having been determined as the place of most satisfactory results for motion-picture projection, including color films.

THE FUTURE

A few words should be said about the future applications of transmission films. Low reflection films were developed and perfected to their present state in specific response to war need, but their peacetime applications are so numerous that they will probably become a permanent feature of our industrial set-up.

Undoubtedly all camera and projection lenses will be coated to improve the quality of natural-color photography as well as those of the ordinary black-and-white.



ALL THE GREMLINS OF OPTICAL SCIENCE go to work when a cameraman shoots into the sun — a feat which, of course, is not done if a final picture is desired. And in this photograph is seen what happens. Reflections, flare, ghosts, and all the others become apparent in the finished picture. This photograph was taken with a Bausch and Lomb, 88-mm. wide-angle, uncoated lens. Compare this with the similar picture below. (B&L photo.)

Certainly eyeglasses, watch crystals, clock faces, instrument cover glasses, microscopes, field glasses and opera glasses, and the like will be among the first of the other articles to be coated to remove annoying reflections.

And, finally, methods may be invented to remove reflections from large surfaces, such as windows in store fronts, automobiles, railroad cars, show cases, display frames, and homes.

Approximately 95 per cent of all the optical glass manufactured in the war years was used by the Armed Services. Hence, the most recently developed applications of transmission films have been connected with military instruments. It is hoped, however, that this short discussion has demonstrated that, out of the holocaust of misery and chaos that is war, there will emerge developments which will make life more pleasant when peace again settles upon the earth.

THE "IMPOSSIBLE" IS ACHIEVED on the same scene, by using Balcote-surfaced lens of identical design. Other details—light, exposure condition, and the like—were the same. While some imperfections occur—the most perfectly coated lens, of course, will not eliminate 100 per cent of the reflections—the improvement is remarkable. What happens with a still-camera lens can be made to obtain cinematographically. (Bausch and Lomb photo.)

Notes on Projection, Projection Equipment

Survey on Makers' Opinion on What Is Best And What They Offer to Achieve Those Ends

Ideal results on the motion-picture screen are those which make the audience forget there is a screen, or a motion picture. The patrons want to forget they are watching a mechanical trick. They do not come to see mechanical tricks. They want real people, living out real life problems—loving, laughing, sorrowing. Ideal screen results allow the audience to imagine that that is just what it is watching.

To provide this ideal result, the projection must be perfect. Specifically, it must satisfy these four requirements: (1) The picture must be steady on the screen; (2) it must be bright; (3) it must be clean; and (4) the focus must be sharp. Any shortcoming in these four respects distracts the attention of the patrons from the entertainment and compels them to take notice of mechanics.

The exhibitor, it is important to remember, pays for perfect screen results even when he does not deliver them to his patrons, because the producers go to enormous expense in the matter of photography and its related arts. That expense is added in to the rental cost of the picture. The exhibitor pays it. He is paying for nothing if he allows his own equipment to destroy the screen values the producers send him in those cans of film.

What happens if the projection is less than perfect in any of the four ways mentioned?

If the picture is not bright enough, the spectators have to make a deliberate effort to see it clearly, and that effort reminds them that they are looking at a picture, not at people. The resulting eyestrain will also remind them. The dinginess—or unnaturalness of colors, in the case of under-illuminated color pictures—will have a similar effect.

All material presented under the name of a manufacturer has been received from the particular company involved. Presentation of this material in these columns does not necessarily signify the endorsement, by the THEATRE CATALOG *or its Editors and staff, of the opinions expressed or of the equipment described.*

As to the very vital need for steadiness, real people in real life do not vibrate up and down. Eye muscles, furthermore, have no practice in ordinary life at following such rhythmic vibrations and, if forced to do so in a theatre, they tire quickly and become painful.

If the focus is not sharp, the unreality of the whole presentation becomes very marked. Real people in real life do not blur here and there. Real people are not streaked, spotted and smeared. Hence, if the picture is to seem real to the audience, it must be clean.

Bright, steady, sharply focused, and clean projection preserves the screen values for which the producers and distributors charge in their rental prices, and for which the customers pay at the box office.

That the reader may have a better understanding of projection equipment—not so much from the standpoint of the actual picture on the screen, but, rather, how it gets there—the manufacturers have been given the opportunity to talk about their products.

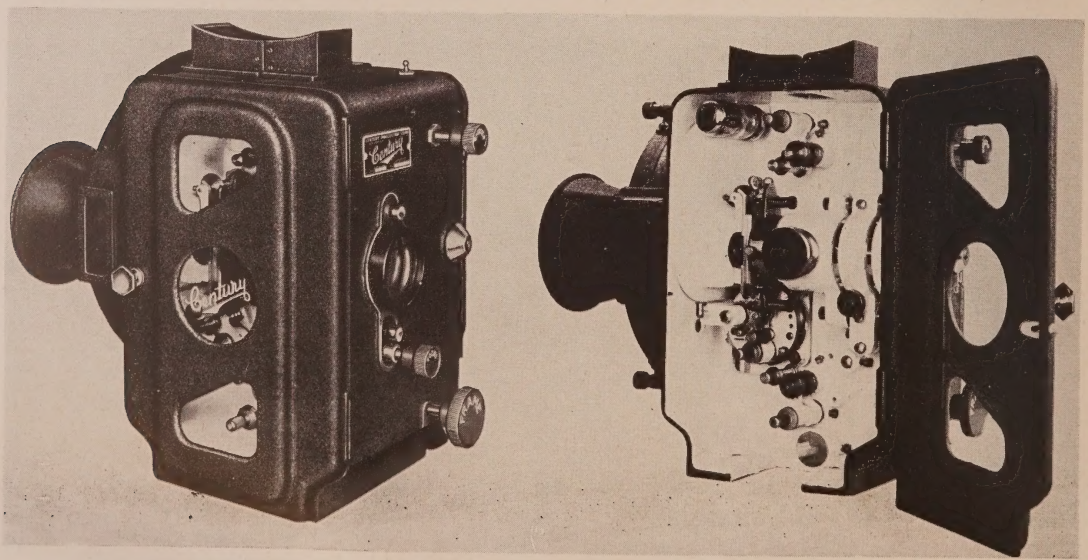
While the various companies, naturally, have good reasons for doing things as they do, all of them still have but one major objective: To create the mechanisms and machinery that will put the best pictures possible on your screen.

For the material that follows, acknowledgment and thanks are expressed to L. W. Davee and the Century Projector Corporation; C. H. Roloff and the DeVry Corporation; Arthur E. Meyer and National-Simplex-Bludworth, Inc. (for the International Projector Corporation); Fred C. Matthews and Motiograph; Homer B. Snook and the Radio Corporation of America; Carl M. Weber, Jr., and the Weber Machine Corporation; and C. G. Ollinger and the National Carbon Company, Inc.

CENTURY PROJECTOR CORPORATION

The history of the design of motion picture projectors in the United States is well known. Until the beginning of the talking motion picture there was little or no reason for standardization

CENTURY PROJECTOR'S MODEL C (SINGLE SHUTTER) AND MODEL CC (DOUBLE SHUTTER) MECHANISMS



of equipment as related to interchangability of operation except, of course, that effort had been made by the Society of Motion Picture Engineers to create standards as to film dimensions, sprocket design and aperture sizes.

With the beginning of sound reproduction other more serious limitations were imposed upon the industry. The sound reproducer became an adjunct of the projector and was designed as a convenient method of providing a motor drive, then becoming more or less popular, as well as containing the items necessary for converting the variations of black and white of the sound track into electrical impulses which could be amplified for the loudspeakers.

As we review the rapidly expanding era of conversion from the silent to sound pictures there are many things which could have been done to give the future of our industry more opportunity for engineering development. One of these decisions could have been to design equipment primarily for the projection of talking motion pictures rather than attempt to use the silent projectors which were never made for the higher film speeds nor the more rigid mechanical hazards of motor drives.

The industry well remembers the bind-ups, stripped gears, hot bearings and closed theatres caused by inadequate equipment lacking the strength and durability to withstand the rigorous service of this new era.

After ten years of such unsatisfactory industry service from projection equipment, the engineers of the Century Projector Corporation began an intensive study in view of developing a projector free from the difficulties every theatre booth faced and something which would be simple and dependable under the most adverse operating conditions.

As a first step in a planned program, the company announced, in 1939, the now well known line of Century Model C and Model CC projector mechanisms.

These projectors were only the first step in this expanded program. Tradition was relegated to the background and the designs adopted were based upon sound engineering principles, together with years of first-hand experience in theatre operation.

Gear designs were simplified to an irreducible minimum, film-handling devices (traps, gates, and guide rollers) were designed to accomplish perfect registration of the film in the aperture of the projector with a consequent more accurate registration of the picture on the theatre screen. Higher light efficiencies were obtained with increased picture definition.

As soon as the new designs of projector mechanisms were well established and production problems solved, the next step in the program began—that of providing a sound reproducer which would match the improved quality of the projector mechanism.

This work did not progress far before World War I began to take all of the facilities of the engineering personnel and shortly the entire production of the factory.

DeVRY CORPORATION

Since the introduction of sound in motion pictures, it has been the custom to add the sound head to a projector originally designed for silent pictures. Such an arrangement results in a lack of harmony between the picture mechanism and sound head, with an inevitable waste in space, material, and number of working parts. These problems have been solved by designing a new, simplified theatre projector incorporating both sound head and picture mechanism as an integral part of the projector.

Absolute simplification is the most difficult task of the designer. The elimination of superfluous intricate parts has endowed the new DeVry theatre projector with physical sturdiness, freedom from operating trouble, and ease of operation.

Into DeVry equipment has gone a wealth of new knowledge and experience gained in the vast laboratory of war production. Back of its sterling performance are new assets of heightened ingenuity, new manufacturing techniques, the jewel-like craftsmanship of men who have devoted a lifetime to the making of fine projectors, and also an old skill which will never change—the fundamental belief in quality, the traditional purpose that every product of DeVry shall first and of all things be dependable.

The sturdiness of the new DeVry is obvious even upon casual examination. It was deliberately designed and staunchly built to outlast your ownership.

You have to see them in action to realize their rock-steady, flicker-free screening, the high fidelity of their true-to-life sound. From the softest whisper, the warmest tone, the weirdest shriek to the roar of a mighty organ there is no perceptible flutter, hum, nor wow.

DeVry was a pioneer in the use of the silent chain drive for motion-picture equipment. This positive, shock-proof method of power transmission has proved itself as a highly efficient and reliable system in the thousands of DeVry 35-mm. professional projectors now in use round the world. The ease, convenience, and flexibility afforded by the silent chain drive in servicing has made the new DeVry projector one of the favorite choices of projectionists. Only in a DeVry are the advantages of the silent chain drive, because of basic DeVry patents involving the use of such a system in a motion-picture sound projector.

The DeVry intermittent is easily and quickly removed as a unit without the need of special tools. One of the finest mechanisms available, it performs with amazing quietness due to precision manufacture. All vital parts are made from selected steel, accurately ground and properly hardened for longer, trouble-free peformance. The movement will not leak or siphon oil into the film compartment to soil the picture or sound track. The position of the intermittent sprocket is below and in exact vertical line with the aperture, permitting a framing mechanism that is a marvel of ingenuity and simplicity, correct framing being accomplished without changing the shutter timing.

The aperture plate casting will not warp under continuous heat of even the highest intensity arc lamp. Film guide rollers assure picture steadiness and eliminate side sway of film. Highly polished and ground film rails guide the film accurately and safely to the intermittent sprocket.

The improved film gate holds film securely and with equalized tension from a point above the aperture to the intermittent sprocket—quaranteeing a steady image. The gate assembly is, without tools, quickly and easily demountable as a unit for cleaning and adjustment between reels.

Film sprockets are of the 16-tooth type reversible type, accurately machined from selected steel and hardened to insure long life and minimum film damage.

The feed magazine accommodates 2,-000-foot reels. Body and door of heavy construction, hinges are cast and chrome plated. The door latch is positive, acting and sure-locking. The fire valve is provided with polished rollers.

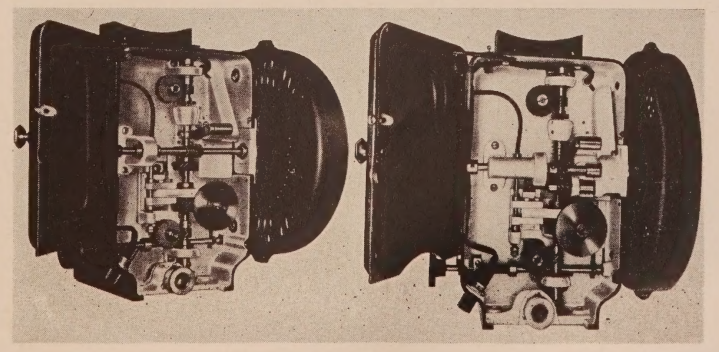
The famous DeVry Brillante lens brings all the brilliance, clarity, and contrast that Hollywood's camera wizards have been able to capture on the film.

A smooth take-up eliminates jerks and tugs. There is no piled up film, pulled splices, or film damage. Tension always self-adjusting for the necessary pull on the film.

The self-locking idlers speed up threading, mere pressure of finger opens and closes the idlers.

In the centralized lubrication oil tubes lead to each bearing and friction point, all other lubricating points easily identified by red oil cups. No vital part is neglected.

CENTURY PROJECTOR'S MODEL C AND MODEL CC (REAR VIEWS)



The rugged mounting plate assures precise alignment of the entire projector mechanism. The precision jig, drilled and machined, allows immediate replacement of parts requiring service with maximum certainty of correct operating realignment.

A synchronizing adjustment is provided for quick, easy timing of shutter with intermittent movement.

A safety shutter protects the film against damage should the light source be accidentally connected and directed against the aperture while the projector is not in motion.

The lens housing is completely enclosed to prevent dust from settling on the lens. Facilities are incorporated for microscopic focusing.

Projector cases of heavy sheet steel have been designed to furnish the maximum protection to the projector mechanism and to insure positive door alignment.

Threading the new DeVry projector is quick and simple, the film virtually flowing into operating position. A threading lamp is provided to illuminate the film-handling mechanism while threading. A secondary aperture separates the pilot lamp, giving clear vision to the film or threading in frame.

The lamphouse carriage is designed to accommodate any standard arc lamphouse. A heavy-duty, alternating-current driving motor supplies all the mechanical power required for operating the projector and sound head.

The projector pedestal is constructed of iron castings and is of sufficient floor area to guarantee adequate maintenance of alignment between the projector and projector ports. A positive tilting device, acting in a manner to minimize projector misalignment with port when projector is tilted, is incorporated.

12000 Series

In a dress of old ivory, with chrome trimming, and with levers, switch buttons, and adjusting-mechanism-heads in bright red, the 12000 series theatre projector and amplifier were unveiled last fall. Outstanding feature is its built-in projector-head which incorporates projection mechanism and sound-head in one compact, complete, and readily accessible and unplaceable unit. The projector head can be removed for servicing or replacement in a few minutes time, without the use of special tools.

Refinements in the picture projector mechanism of the 12000 series result in reduced temperatures at the film gate—less than 150 degrees when operating with high-intensity arcs—adding greatly to the convenience of the operator in the handling of film. These improvements also eliminat any possible damage to the film from high aperature-rail temperatures.

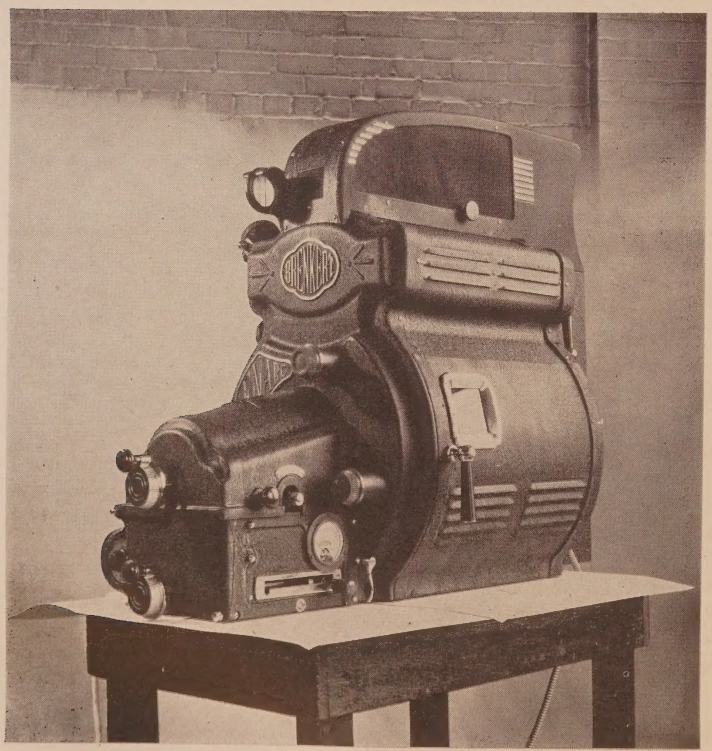
The pedestal of the 12000 series incorporates several refinements, including; (1) four-point leveling; (2) improved and more rugged elevator mechanism; and (3) a training mechanism which allows projector to be swung from side to side for screen alignment. The new base is interchangeable for all types of arcs and projector heads. The new base is designed for absolute rigidity, to assure vibrationless performance.

The 12000 series projector is pinned and registered to the arc lamp pedestal in such a way as to allow about five minutes for changeover of the complete mechanism—expediting any required servicing. All wiring terminates in a barrier-type terminal strip, eliminating any necessity of splicing during projector's installation.

For the 12000 series, film magazines are available up to 4000-foot capacity. Both the feed and take-up magazines are instantly removable for servicing or adjustment.

The 12000 series is an addition to the DeVry line of motion-picture sound equipment, and will be available, when desired, in either battleship gray and in the new ivory and chrome Victory dress.

RADIO CORPORATION'S BRENKERT ENARC PROJECTION ARC



INTERNATIONAL PROJECTOR CORPORATION

A good projector is one which assures an audience of pictures that are steady, bright, clean, and in focus, but a poor projector impairs these qualities. It is not enough for a mechanism to produce ideal screen results only when it is brand-new. A cheaply-and-carelessly-built device might do almost as much when it is just fresh from the factory.. But it would not stand up very long under the kind of strain a projector must endure. In the mechanism, the most sensitive, delicate and important parts are just the ones that have to come to a full stop and start again 160,000 times to show one feature picture. Yet it must continue to deliver ideal screen results after many years of that kind of strenuous operation. Otherwise, it is not a practical machine for practical theatre business.

The almost endless field of the mechanical arts has been searched and researched from end to end for devices and materials to be used in motion picture projectors. The field of the mechanical arts is so large that there is always more than one way of doing a given thing. Each separate requirement of good projection can be met by a number of different mechanical arrangements—there is no "one and only" way of dealing with these technical problems.

But the designers of Simplex projectors are convinced that in solving most of them there is only one best way. This conviction they derive from a great many years of experience, for the companies now merged in International Projector Corporation were the pioneer companies of the business.

Their experience has taught them not only what devices and methods in a projector mechanism will best give the desired screen results, but what methods will best continue to give them year after grinding year.

Steadiness of Image

To illustrate, consider one or two details of the problem of maintaining a steady screen image. Here is what seems to be a trifle—Simplex E-7 intermittent sprockets are ground to dimensions after hardening. In other words, when the sprocket has been ground and gauge-inspected, it is put on the pro-

jector. It is not first ground to dimensions and then submitted to a hardening process which may warp the delicate exactness of those dimensions. Now it is obviously more expensive to grind hardened metal than soft metal. International Projector Corporation does not go to that expense without reason. The reason is that experience has shown grinding after hardening gives a steadier screen image. Additionally, this method of hardening gives longer wear.

The above may be considered typical of an immense number of details, each small in itself, that contribute to producing a steady picture—or the reverse. In the case of the intermittent movement which drives the sprocket just referred to: 13 different points on the star wheel are ground to an accuracy of 1/10,000 inch. At the same time, experience proves it is equally important not to have such close fit at other points. Here again their vast background of experience guides IPC technicians in selecting the one best procedure, having in mind not only the excellence of the immediate results, but the durability of that excellence through years of gruelling operation.

Again, in the gear train, Simplex E-7 design features hunting-tooth gearing, which means simply that the same two teeth do not mesh at every revolution. If they did, high spots would inevitably develop, and every time a high spot came around the picture would jump a little on the screen. With hunting-tooth gearing a given tooth on one gear meshes with a different tooth on the mating gear at each revolution. High spots can not appear.

Another small but vital detail is the cushioning of the gear train against the unavoidable vibration resulting from the start-stop-start-stop nature of the intermittent action. For this purpose, Simplex E-7 designers introduced a shock-proof gear, composed partly of resilient material. This material takes up and cushions the vibration from the intermittent movement, minimizing the chance that this vibration will appear on the screen as picture jump.

If the picture is to be steady, it is also neeessary to hold and position the film very accurately while it is in the gate. But film sometimes varies in thickness. Therefore best results can be obtained only if the gate pad tension is adjustable. In the Simplex E-7 cone-shaped springs apply equal tension to the pads bearing against both edges of the film; this pressure can be adjusted at any time, in a second or so, without tools, and while the film is running. Each adjustment will apply, automatically and inherently, to both edges of the film alike; and when it is completed it can be locked down without tools.

In their ardent and experience-guided search for the one best way of meeting every mechanical problem related to steadiness of the screen image, Simplex E-7 designers believe they have been successful, and very proudly point to the proof—a vertical jump of less than 1/8 inch per 12-foot screen picture.

Horizontal unsteadiness, or weaving, presents a less difficult problem, but of course, also, must be controlled. Simplex designers here drew on their very extensive experience with Hollywood equipment and fitted the E-7 with studio-type guides of the same nature as those used in the camera.

Screen Brightness

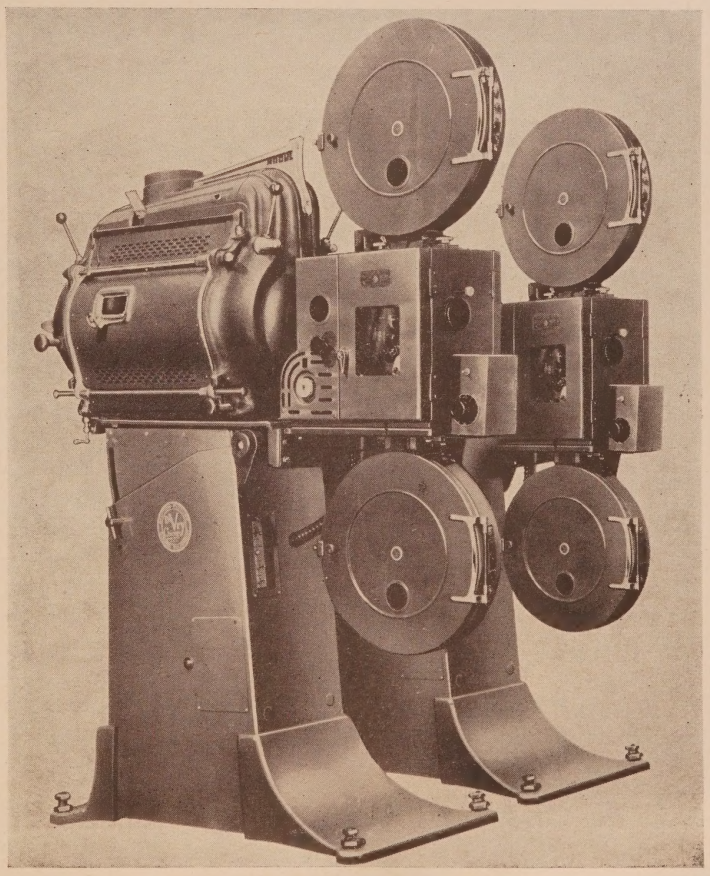
The picture must be bright as well as steady. Simplex was the first manufacturer to introduce double shutters. Twenty-four frames, or stills, are projected each second; each one is exposed twice, making 48 exposures a second; each exposure involves one transition from a darkened to an illuminated screen and one from illumination to darkness—96 transitions between light and darkness in each second of operation. Use of double shutters, pioneered by Simplex, causes the area of light to appear first at the center of the screen and spread toward top and bottom; similarly regions of darkness appear at top and bottom and meet at the center. Not only is this "dissolving effect" more pleasing to the eye, but the 96 transitions a second take only half as long to complete. The shutter blades can therefore be made narrower; 70 instead of 90 degrees. The period of total screen illumination is lengthened accordingly; the increase in the illumination and therefore in the brightness of the picture is 20 per cent.

Cleanliness of the Picture

One important cause of dullness in the screen image may be the presence of a layer of lubricating oil on film or lenses. The one-shot lubricating system of the E-7 has a number of striking advantages; among them, that oil does not get on film or lenses. It is confined to a system that is completely closed, so far as the film side of the projector is concerned; it is applied under pressure to each bearing in the exact quantity that bearing needs, with no excess. Cleanliness of the image is further enhanced by provisions against dirt, and these provisions also reduce the possibility of the film being scratched by dirt.

Among other protections against a dirty picture are, for example, the ease with which both film gate and film trap can be removed. The gate can be taken out without tools, and in a few seconds. It can be replaced as readily. The trap is also removable in a few seconds, with only a screwdriver and the loosening of two screws. The film, of course, passes between gate and trap. Loose dirt in that location can get into the light path and be projected as shadows on the screen. This also is one of the places in the mechanism where the film is most

DeVRY's 12000 SERIES PROJECTOR



likely to be scratched by dirt if there is any. The construction of the Simplex E-7 makes it extremely easy for the projectionist to keep this region immaculately clean. He can without difficulty and very quickly remove trap and gate both in order to clean them completely; and he could do it between reels without taking any appreciable amount of time from his other between-reel duties.

The white-enameled illuminated interior of the operating side of the mechanism is another provision against dirt. Dirt could hide and accumulate far more easily in a dark and obscurely lighted film compartment.

Sharpness of Focus

Maintaining sharpness of focus on the screen is largely a matter of keeping the film flat at the point where it is being projected. If the film is corrugated (buckled), or if the little still picture under-going projection swells out like a sail in the wind, every part of the film image will not be at the same distance from the lens. Then it will be an optical impossibility to secure a screen image in sharp focus at every point. Under such circumstances some areas of the picture that the audience sees will be blurred, often very badly blurred.

At the instant when a given film image comes before the aperture to be projected, it comes into a region of higher temperature, and therefore expands. Since the film is very rigidly held in the aperture (to insure that the picture on the screen will be steady) the only way the film image can expand is by swelling like a sail. This is called "breathing" of the film. It impairs the accuracy of the focus. It must therefore be kept to a minimum.

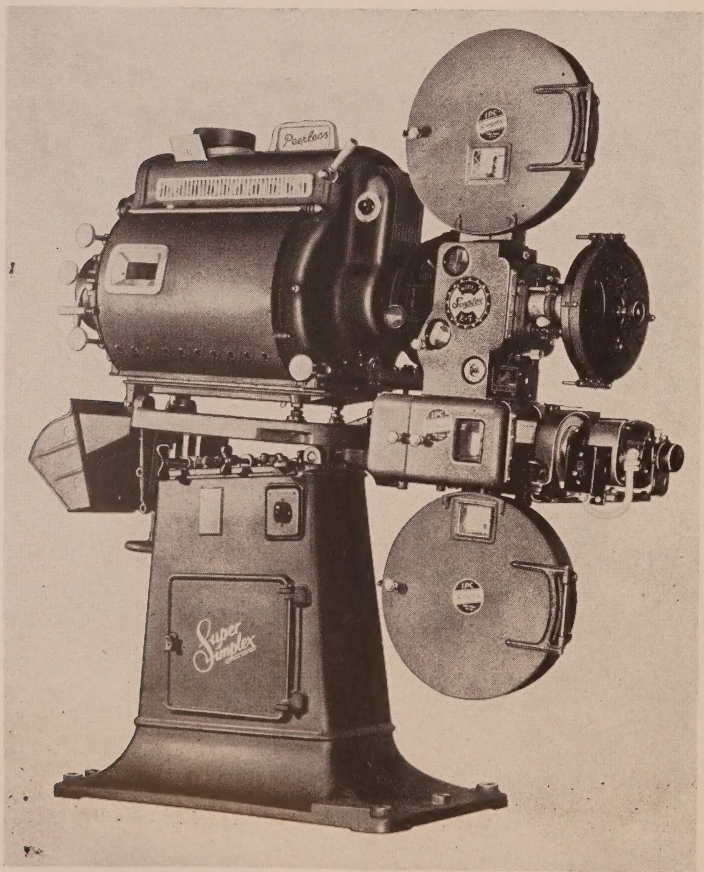
Sometimes, especially with high-intensity sources, the heat at the aperture may become great enough so that the film is partly dehydrated, and wrinkles or "buckles" in consequence. This is a permanent injury, not a temporary condition like breathing. When that print is run next show, it will give a blurred image, and nothing can be done about it. It will never give a sharp picture again.

Buckling must be prevented and breathing minimized. For these purposes the Simplex E-7 is equipped with a highly efficient cooling system. Cooling air, however, is not blown into the film compartment—it might carry dirt or carbon particles with it to soil or scratch the film. Instead, a sight box, through which the light must pass, is cooled, and thus a great deal of heat is taken out of the light beam before it reaches the projector. This ribbed sight box, located between aperture and rear shutter, intercepts and disperses heat so efficiently that at the end of a full day's operation it is not even warm to touch. The sight box in turn, is cooled by powerful vanes mounted on the rear shutter, which act like a strong suction fan, drawing air backward from the aperture.

The physical design of the mechanism, further, minimizes the effect of buckling. The film does not run free between gate and intermittent, but is firmly held in position by the intermittent film guide at the point where it leaves the gate. The result is that faults in focus caused by breathing of the film, and any possibility that the next show and future shows will be marred by buckling, are substantially eliminated.

Micrometer-type lens adjustment also assists materially in securing and maintaining the utmost sharpness of focus on the screen.

INTERNATIONAL PROJECTOR'S SIMPLEX E-7 PROJECTOR



Experience

Space does not permit describing the many other devices and mechanical features incorporated into the Simplex E-7 mechanism for the purpose of giving ideal screen results, nor the sometimes elaborate considerations that govern the exact choice of materials to be used at every point. In each small detail the designers, guided by an immense background that reaches back to the earliest pioneer days, have sought to find the "one best way" and to build the projector accordingly.

Eight years of experience in the thousands of theatres in which Simplex E-7's are installed, and the many laudatory comments from exhibitors, projection supervisors, and projectionists using the mechanism, offer flatteringly impressive evidence that those efforts have been highly successful—that the E-7 is in fact what its designers tried to make it: the world's finest projector, build for tomorrow today.

MOTIOGRAPH

Motiograph projector equipment is available as follows: Model K deluxe mechanisms, Model S stands, Model K 18-inch upper magazines, and Model K 18-inch lower magazines.

Model K de Luxe Mechanisms

A few of the features of the Model K deluxe projector mechanism are cast iron case and main frame on a main frame casting designed for strength and rigidity, with removable oil-absorbent bushings permitting easy replacement of standard-size shafts.

The one-piece horizontal cylindrical shutter rotor is statically and dynamically balanced, free running on large ball bearings, permanently adjusted for end play. This rotor gives more light on the screen than any other shutter mechanism and a flickerless dissolving effect found in no other type shutter.

The rotor of the automatic air cooling systems draws temperature air through housing, forcing it toward film gate door,

hence all parts of the film tension system are always cooled.

Shutter synchonizing device is easily and quickly adjustable to perfect synchronization of shutter and intermittent movement.

The intermittent movement has a unified drive with ball-bearing end thrust, web-backed star wheel, sprocket and cam hardened and precision ground, as well as removable oil-absorbent bushing and grease-lubricated movement, thus preventing oil leakage.

The star wheel is hardened and then ground to permit 1/10,000-inch tolerances providing for longer wear.

Rims and radii of sprocket teeth are hardened after being hobbed to minute tolerance by specially designed machines. A final sand blasting process eliminates any microscopic sharp edges on sprocket teeth.

These gears are accurately cut and have the most exact centers of any gears used in any projector. All steel gears are either hardened or made of special steels, and thus give the acme of long wear.

Motiograph mechanisms use only Bakelite and steel gears, none of cast iron or bronze.

All shafts are hardened and ground, thus giving long wear.

Automatic fire shutter releases as film speed diminishes, gives positive fire protection.

Individual tension springs on shoes provides for a steady image on the screen, regardless of film condition.

Studio-type guides in conjunction with guide rollers impart steady motion to film, preventing sidesway of film.

Threading facilites are quicker, most simple and accurate, and give the projectionist more time to attend to maintenance.

The framing lamp guards against misframing.

Lens holder gives rigid support to any type of lens.

In the illuminated white interior, dirt can be easily seen and promptly removed.

The finish is crinkle gray to match other parts of the projector.

All Motiograph projection equipment has been inspected and is listed as approved by the Underwriters' Laboratories, Inc.

Model S Stands

The S stand provides for precise horizontal optical alignment, as its lamphouse carriage may be moved from side to side in three slots on its main frame casting. After being adjusted to the proper position, the carriage casting can be securely locked in place by means of three hexagon cap screws.

The lamphouse carriage is designed to fit any standard arc lamphouse.

Vertical optical alignment of the lamp and mechanism is simple. A large cap screw raises or lowers the union block supporting the sound reproducer and projector mechanism to the desired setting. Four screws then lock the union block securely in its proper place.

Angular adjustment is a simple operation with the easily accessible tilting device. This device like all others, may be securely locked in position. All possible projection angles are readily provided for as the S stand may be tilted 32 degrees in a downward direction and 17 degrees in an upward direction.

Leveling screws are provided to compensate for irregularities in the booth floor and to permit exact and easy leveling of the image on the screen.

An arc switch, of the 100-ampere, double-pole, single-throw type, is furnished. A motor starting switch is conveniently placed on the operating side of the stand.

The entire S stand is constructed of grey cast iron and heavy gauge sheet steel and its weight of 216 pounds is evenly distributed over a floor area of 25 inches by 32 inches. The base of the stand projects forward so that the entire projector is well balanced and steady when even the greatest projection angle is utilized.

The finish is crinkle gray to match other parts of the projector.

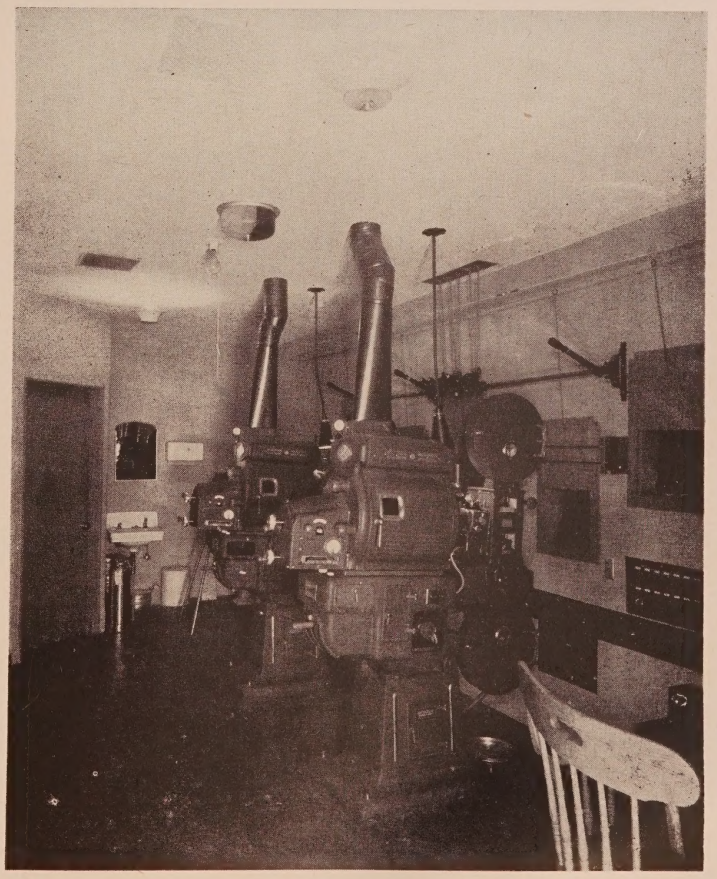
Magazines

A full 18 inches in diameter, Motiograph Model K Magazines accommodate 2,000-foot reels with ample additional room for convenient loading and threading of the film. Both the bodies and the doors, are of heavy one-piece steel construction. Hinges are cast and nickel-plated. Door latches are easily operated and positive in action. Spiders and mountings are of cast iron. Fire valves are provided in both upper and lower magazines with polished steel rollers designed to prevent film scratches. The finish is crinkle gray to match other parts of the projector.

The upper magazine is provided with an adjustable reel shaft tension device which prevents even the heaviest reel from over-running and causing film breakage.

The lower magazine is equipped with Motiograph's famous positive cone friction take-up as a standard accessory. This take-up has gained universal recognition among projectionists, as being outstanding for ease of adjustment, smoothness, operating safety, and freedom from service trouble. The cork clutch facing is securely fastened to a heavy conical steel pressure plate and is unaffected by over-oiling. It cannot wrinkle or roll up, as do the facings of conventional take-ups. Take-up tension is easily adjusted while the projector is running, by simply turning the knurled adjusting knob. The conical tension spring distributes its force evenly over

MOTIOGRAPH'S PROJECTOR



the entire pressure plate, greatly prolonging life. Ball thrust bearings insure smooth operation, an essential to perfect sound and projection.

RADIO CORPORATION OF AMERICA

Good picture projection can be obtained only with high-quality equipment, properly installed and adequately maintained. Generally speaking, the theatrical industry has long recognized this fact. In addition, however, it is now realizing the desirability of coordinating units to obtain the highest possible performance.

Research by the Academy of Motion Picture Arts and Sciences, by the Society of Motion Picture Engineers, and by various equipment manufacturers, has established the fact that accurate coordination of the various pieces of equipment is a prerequisite of optimum performance.

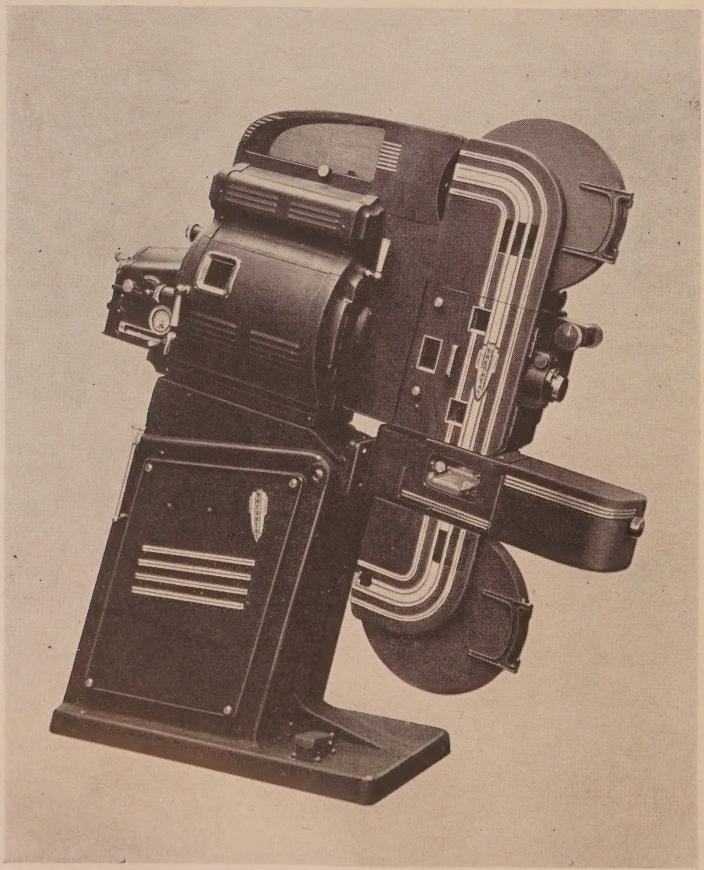
For instance, the size of the arc lamp and its operating current, the shutter cut-off time, the effective aperture of the projection lens, and the screen size and surface, all control the apparent screen brightness level, as visible to the audience. If this brightness level is too low, the picture is dim; if it is too great, any defects in projection are emphasized and shutter flicker may become objectionable.

This latter condition is usually immediately apparent if the projector is operated without film, throwing brilliant white light on the screen. If the screen illumination level is adequate for good presentation of Technicolor pictures, and a light black-and-white film is shown, any defects in projection caused by unsteady machine operation, or improper design, may be painfully apparent.

Screens

The type of screen surface will be governed somewhat by the length-to-width ratio of the seating area. A silver screen may be used in a long, narrow house, whereas in a wider house a uniformly diffusing screen, such as the RCA Showhite, is required to insure good visibility at the side seats. The wider house will therefore require more light on the screen to provide suitable screen brilliance for side seats; this necessitates a larger and more powerful lamp, with its increased current drain. Naturally, a larger arc-lamp supply will then be required.

RADIO CORPORATION'S BRENKERT PROJECTOR



Projector

It would be desirable also for the operator or theatre owner to consider using a projector which, like the Brenkert type BX-80, has both shutter blades between the lamp and the projector aperture, where both blades are effective in keeping heat from the film, as well as in producing the quickest possible cutoff of the light beam. Quick, complete cutoff gives maximum screen illumination with minimum travel ghost, thus saving light and aiding in obtaining a sharp, brilliant picture.

If a large screen picture is required, any jump or weave of the film as it passes through the projector aperture will be magnified to a greater degree on the screen. Thus, a projector which reduces film unsteadiness to an absolute minimum will be required. The Brenkert projector meets this requirement, and will continue to do so for a long time, because of its balanced design, oversize parts, and positive-feed continuous oiling system. This oiling system utilizes a circulating pump and an oil splash system, just as an automobile engine does. It will be remembered that automobile engines were never satisfactory prior to the development of this type of lubrication system; now, they operate satisfactorily and develop little wear or noise even after years of operation, with no attention to lubrication other than occasional oil changes. The same thing is true of Brenkert projectors.

Lamp and Light

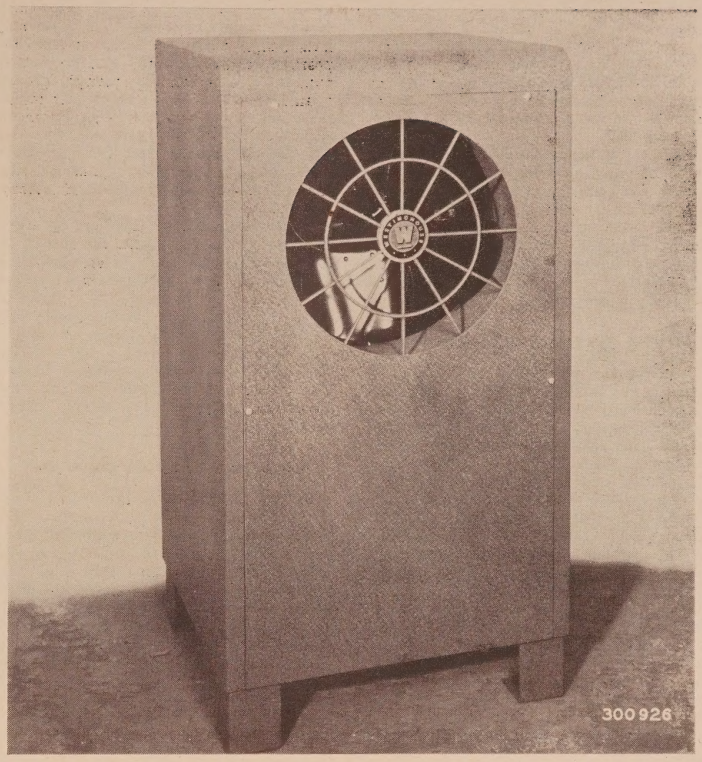
The projection arc lamp also must be coordinated with the rest of the equipment. Numerous types of lamps are now available in various powers and designs; but quite often prospective purchasers are puzzled as to which type to buy. The most efficient lamp is the one which puts the largest amount of light into the projection lens and on the screen in proportion to the power consumed. This naturally results in the lowest possible electric bills. Because the arc lamp is the largest consumer of power in the projection room, any saving in electric current it uses amounts to a considerable sum of money in a year's time.

Part of the light given off by the positive carbon crater and the arc gas is collected by a reflector, and concentrated on the film at the aperture. If all the light given off by the arc could be collected and passed to the screen, the light-utilization of the lamp would be perfect. Unfortunately, this is impossible. In order to collect all the light produced, the arc would have to be completely enclosed by a perfect mirror. Naturally, no light could then escape or be reflected to the projection lens. In practice, therefore, the arc is only partially enclosed by a mirror. This mirror is large enough, and so placed, as to collect as much light as is practicable. Light reflected from any point on this mirror will travel in a straight line from that point: the light from the arc will be reflected to the film aperture. To insure even illumination over the entire aperture, and therefore over the film picture, the spot of light is made slightly larger than the aperture.

The light which passes through the film will be somewhat scattered, or dif-

fused. The shorter the focal length of the projection lens, the closer it will be to the film, and the more of this scattered light will enter it and be focused upon the screen. If a very large reflector is used in the arc lamp in an effort to collect more light from the arc, and a long-focal-length lens is used at the same time, the light reflected by the edges of the mirror may enter the aperture at such a steep angle as to cross the lens housing completely and strike the side before reaching the lens. Any such light will not enter the lens, unless it is reflected from the side of the lens housing, and will not contribute to producing illumination on the screen. However, it will heat up the aperture plate and film. Making the reflector so large as in the instance cited would be an extreme case, but will serve as an example of how lack of proper coordination between units may fail to produce the desired result, and also introduce other undesired effects.

Another problem that must be solved is that of an arc lamp with unsteady carbon feed, this is a hazard in the projection room and a detriment to good picture quality. Many a yellow or blue tinted screen is caused by improper carbon feed. The general purpose RCA Enarc high intensity arc lamp utilizes a very flexible and fool-proof carbon feed mechanism. The motor speed which controls the feed of both positive and negative carbons is regulated by a potentiometer. In addition to this over-all speed control, a separate adjustment of the negative feed can be made with relation to the speed of positive carbon feed. These two adjustments make it possible to accurately adjust and regularly sustain the feed of both positive and negative carbons so that a uniformly brilliant and white screen is consistently produced.



RADIO CORPORATION'S WESTINGHOUSE RECTOX COPPER OXIDE RECTIFIER

Current Converters

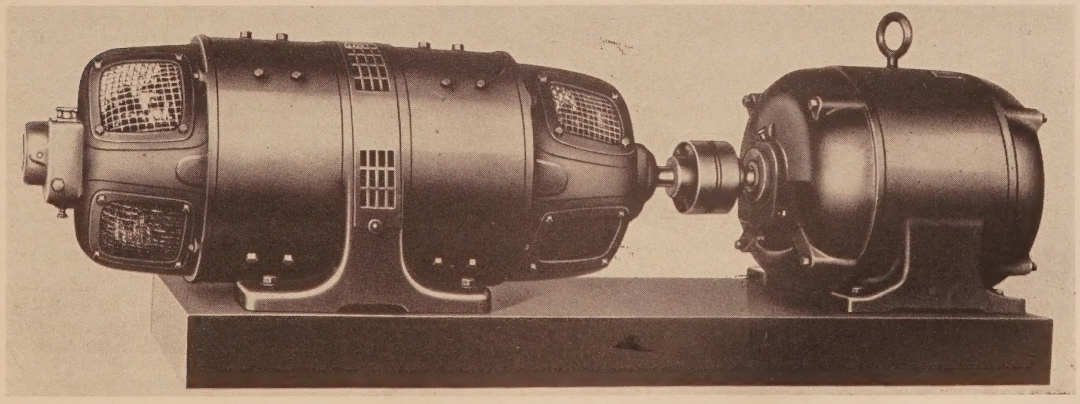
The arc power is usually obtained from the a.c. power line, so some form of conversion device is required. Motor generators and rectifiers are available for this service. Each has certain definite advantages and limitations. The Century-Roth motor generators now sold by RCA have been noted for years for their sturdy construction and unfailing operation. Certain types do not require d.c. ballast resistors, thus eliminating ballast power loss.

The Baldor tube rectifier and the Westinghouse copper-oxide rectifier need no introduction, since both have enjoyed a reputation for utmost excellence during many years.

The choice of units will depend upon local conditions. The electrical efficiency of the rectifier will generally somewhat exceed that of the motor generator, thus reducing a.c. current drain. On the other hand, the rectifier has no storage action, so it must pass on to the arc lamp any fluctuation or momentary interruption of the a.c. supply. The motor generator will tend to smooth out these interruptions because of its flywheel effect, so if power supply fluctuations exist, the small extra cost of operating a motor generator may be well worthwhile in avoiding momentarily dark screens.

If a rectifier is to be used, the type

RADIO CORPORATION'S CENTURY-ROTH MOTOR-GENERATOR



chosen will again depend on local conditions. Where a plentiful supply of clean, cool air is available, the copper-oxide rectifier will give long and dependable operation. On the other hand, the rectifier tubes in a bulb-type rectifier are easy to replace when their useful life is expended.

All these factors must be taken into account when ordering projection equipment. Each unit must be carefully chosen to perform properly its own function when used with its associated equipment. Careful planning in this respect will pay dividends for many years, both in superior screen results and in economical booth operation.

WEBER MACHINE CORPORATION

During the war years, the entire manufacturing facilities of the Weber Machine Corp. were devoted 100% to the manufacture of precision war work. Once again, the entire organization has been converted back to the manufacture of projection and sound equipment.

The Weber Machine Corporation announces a complete new line of Syncrofilm projection and sound equipments, which includes a Syncro-Dynamic theatre sound projector, Syncrofilm 400 sound heads, syncrofilm 60 and 20 theatre amplifiers, and a well-matched speaker system.

Syncro-Dynamic theatre projector combines in one compact unit, projection and sound. Many new features are incorporated in Syncro-Dynamic, which includes a new hinged type film gate, adjustable film shoes, and a method of cooling aperture with cooling vanes on shutter. All intermittent parts and sprockets are standard, and are interchangeable. The sound system which is built in the mechanism, uses a new tyype cylindrical lens system, and utilizes a new and patented dynamic filter, which has proven to be a superior method of dampening action for rotary film drum. The projector is driven by a silent gear tooth chain for positive and quiet drive.

Syncrofilm 400 sound heads represent the latest developments in sound reproduction, and are adaptable to any standard theatre projector. Syncrofilm 400 sound Head is driven by a new type tooth and link design chain, to assure a smooth, positive action. Dual exciter lamps facilitate instantaneous change should a lamp burn out. The photo-electric cell is mounted in a shock absorbing material, within which photo cell is protected against mechanical and exterior electrical disturbances. The dynamic filter is used for exacting control of rotary film drum.

Syncrofilm theatre amplifiers are supplied in two models, with an output of 20 and 60 watts. The latest improvements in the field of Electronics are incorporated in these amplifiers to make it an outstanding theatre amplifier. Modern in design, construction and materials.

A well matched speaker system can also be suppled in conjunction with this equipment. making possible a complete Syncrofilm Projection and Sound Installation.

NATIONAL CARBON COMPANY

In the years immediately preceding World War II considerable progress had been made in the manufacture of projector carbons. This is amplified by the development of the simplified high intensity arcs, the low wattage (1-kw.) high intensity arc and the development of improved carbons which greatly increased the efficiency of the high powered high intensity arcs. In addition high intensity arcs were also made available for the projection of 16-mm. film.

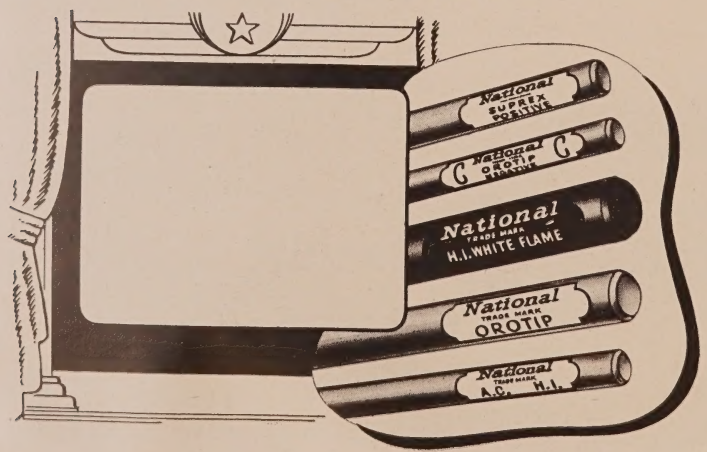
These developments brought high quality, high intensity projection within the reach of every theatre, large and small. The installation and operating costs were remarkably low, amounting to only a little more than 2 per cent of the total expense of theatre operation. The brilliant snow-white light of daylight quality from these high intensity arcs was ideally suited to the projection of the modern color features and greatly improved black and white projection as as well. A higher level of screen illumination was also obtained which along with the other advantages offered by these arcs made seeing easier and added greatly to the comfort of the theatre audience. This higher level of screen illumination also permitted more light for the general illumination of the theatre auditorium thereby eliminating the necessity for groping in the dark to find seats and adding to the general safety of the audience in other ways. All of this was an effective boxoffice stimulant. Regardless of the size of the theatre the patrons could be sure of a clear, natural and pleasing portrayal of the pictures on the screen.

This progress in projection lighting was advancing until the early part of 1942 when government requirements for copper for war purposes made it impossible to continue the production of carbons with the thickness of copper coating formerly supplied. Every effort was made to comply with the order to conserve this vital metal and the situation was met successfully by the introduction of the new Victory carbons with reduced thickness of copper coating. As a result of cooperation on the part of all concerned these new Victory carbons have done remarkably well in maintaining a high standard of screen illumination. In some cases, the screen lighting was actually improved by the use of the Victory carbons without the necessity of any adjustments in the equipment. An ample supply of projector carbons has been maintained throughout this emergency, thereby allowing every theatre to operate regardless of the type of projection equipment used.

From the carbon point of view therefore, the motion-picture show has gone on without any curtailment in supplies or in the quality of the light on the screen. This represents a real contribution to the success of the motion picture industry whose product is so useful in these times as a medium of education, morale building and recreation. It is fitting also to pay tribute to the arc lamp manufacturers, distributors, theatre owners and projectionists for the excellent support they have given to this entire program. The nation's war effort was helped very materially by the large amount of copper diverted and salvaged by the motion picture industry. This effort should continue even in the years of peace.

While it is difficult to list definitely at this time any of the new developments in projection arcs to be expected in the immediate post-war period it can be said that the possibilities for improvement can be measured to some extent by those made in the years immediately preceding the present war. Greater latitude in operation can be expected when full copper coating of carbons can be resumed. There will undoubtedly be new developments in projection lamps, arc controls and optical systems which in combination with carbon developments can lead to more efficient operation, and to screen light of higher intensities than are now available. The carbon arc is an extremely versatile and efficient light source easily adapted to many conditions of operation in both small and large units. The power that can be concentrated in a single arc is limited only by the capacity of the equipment with which it is used. Carbon arcs with an intrinsic brilliancy greater than that of the sun have already been attained.

NATIONAL CARBON'S TRADE MARK



Notes on Sound and Loudspeaker Equipment

Survey of Makers' Opinion on What Is Best And What They Offer to Achieve Those Ends

To provide vital, living sound entertainment; to recreate the tenseness of drama, the natural realism of dialogue, the thrill of full fortissimo, the crash of angry thunder, the faint rustle of leaves, the excited whisper—and yet throughout assure very patron of comfortable listening pleasure—should be the goal toward which every exhibitor should set himself.

Dramatic effects, full orchestra, and vocal climaxes require acoustic power in very large amounts. This means that adequate amplifier power and high efficiency of the loudspeaker system are needed to produce the power needed to give the theatre de luxe presentation regardless of its size

While to achieve this end all elements of a sound system should be the best that can be afforded, it is of the performance of the loudspeaker system that the patron is most acutely aware. Accordingly, the speaker system for the desired de luxe presentation must have high power capacity to stand up under the strain without failure and without distortion. Recording studios are now extending the dynamic range of recording, and these developments will place new demands on the power delivered by the speaker system.

Excellence of dialogue presentation requires that the speaker system have a broad frequency range, with the voice overtones properly balanced against the fundamentals, with all frequencies handled smoothly and without improper emphasis of some and absence of others. De luxe presentation of music requires still broader frequency range, from deep bass to the highest overtones, and here the necessity of proper balance assumes an added importance.

De luxe presentation requires that the speaker system have uniform distribution to carry the full frequency range to all the seats of the theatre. Seats with poor sound coverage should now be considered a thing of the past. The speaker system must have the correct physical proportion for the particular auditorium in which it is installed. It has been proved that a speaker system, suitable for a 600-seat theatre, fails to provide top performance for one of 800 seats, delivers a noticeably poor one for 1,200 seats, and is wholly inadequate for a 2,000-seat theatre.

Accordingly, to secure de luxe presentation in theatres of all sizes and types a large number of combinations of horns, high- and low-frequency speakers, must be available.

Wartime improvements in materials and new achievements in design have produced greatly increased efficiency in sound systems and speakers. Greater utilization of available amplifier power and its transfer to acoustical power in a wider frequency range has resulted in extending the bass range and improvement of definition in sounds which occur throughout the range. Intimate and more natural screen presence, higher intelligibility, more perfect balance between high and low frequencies, realism, and elimination of backstage reverberation and hangover are available in the newer equipments.

That the reader may have a better understanding of sound equipment—and some of the equipment that is now or presently will be available—the manufacturers have been given a chance to talk about their products.

All material presented under the name of a manufacturer has been received from the particular company involved. Presentation of this material in these columns does not necessarily signify the endorsement, by the THEATRE CATALOG *or its Editors and staff, of the opinions expressed or of the equipment described.*

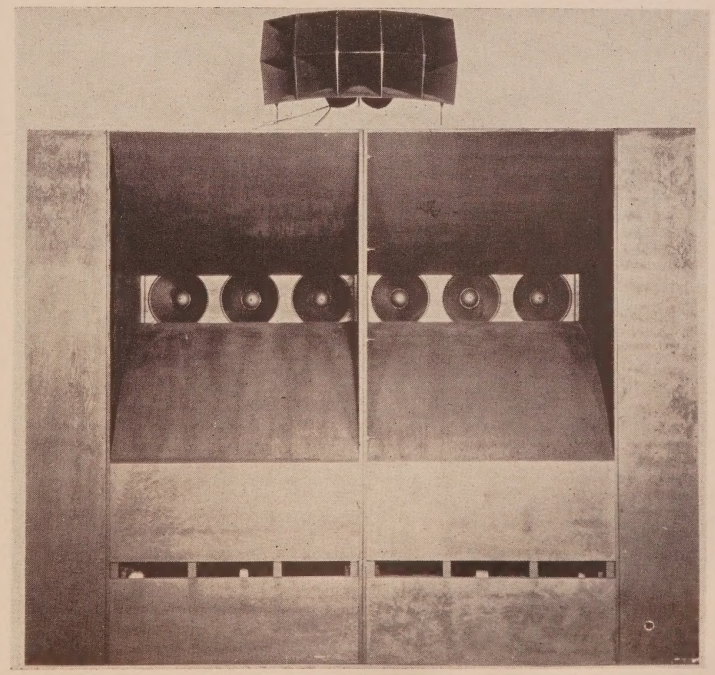
While the various companies, naturally, have their own very good reasons for doing things as they do, all of them still have but one major objective in view: To create mechanisms and machinery which will give your theatre patrons the best possible sound.

For the material that follows, acknowledgment and thanks are expressed to L. W. Davee and the Century Projector Company; C. H. Roloff and the DeVry Corporation; A. J. Lindsley and the National Theatre Supply Division of National-Simplex-Bludworth, Inc., (for the International Projector Corporation); Fred C. Matthews and Motiograph; Homer B. Snook and the Radio Corporation of America; and C. L. Stong and the Westrex Corporation.

ALTEC-LANSING CORPORATION

The Voice of the Theatre brings to the screen living, breathing characters, sound effects which are natural, and music which is authentically reproduced. Every seat in the theatre is equally reached by the wide frequency range of the Voice of the Theatre, assuring high intelligibility along with easy, comfortable listening for every patron. They en-

ALTEC-LANSING'S MODEL A-1 VOICE OF THE THEATRE



joy the show free of strain and irritation, and leave the theatre rested, relaxed, and satisfied.

The Voice of the Theatre brings properly balanced proportions of high and low frequencies throughout your entire show. Voices, music, and sound effects flow out in exact relation to each other, exactly as they are planned and recorded at the studio.

The Voice of the Theatre has overcome the barriers of reproducing bass. By spreading out the range of bass frequencies, character and definition is given to the varying values of voices, instruments, and sound effects which require proper reproduction in the lower frequencies.

From the whisper of wind in the tree tops to the thunderous, grinding roar of an earthquake, each sound effect, individually and collectively, is presented with vivid realism. The Voice of the Theatre presents the reproduction of sound effects as loud or soft, as high or low, as sharp or dull, as irritating or soothing as they actually sound in every day life.

The Voice of the Theatre projects all available sound energy into your auditorium perfectly proportioned, and free of backstage reverberation or hangover. Because of airtight, back-wall construction, completely eliminating rear radiation of sound waves, the presentation of programs is clear, true, and evenly distributed to every seat of your house.

A short straight air column increases presence, exclusive vertical ports utilize all available sound energy, rigid construction perfects vibration-proof, absorptionresistant horn walls. These are a few more of the many features enjoyed with the Voice of the Theatre.

The reproducing efficiency of the sound system is greatly increased with exactly the same power now being used. In many instances, this increase in efficiency will be six times greater than any performance thus far enjoyed.

The Voice of the Theatre, with wide dynamic range, delivers the true quality and naturalness of all music, dialogue, and sound effects.

The construction of both high and low frequency speakers in the Voice of the Theatre provides a safety margin for even the most demanding power requirements. The rated power of each loudspeaker system provides deluxe presentation, at the same time providing plenty of protection against infrequent or accidental overloads.

Fewer component parts and the simplified construction of the Voice of the Theatre permits easy and quick assembly immediately on its arrival. The newly perfected replaceable high and low frequency diaphragms save time, money, and irritation. In event of accidental damage, they can be quickly removed and replaced.

High-Frequency Features

High-frequency, true exponential, multicellular horns of the Voice of the Theatre also bring you designs and perfections by the nation's top flight sound engineers. The new high frequency horns are novel in design, rigid in construction and perfect in performance. A large selection of cell sizes and configurations provides perfect high quality sound reproduction and distribution in accordance with the individual architectural and acoustical requirements of each theatre.

Perhaps the most important feature of the new high-frequency speaker of the Voice of the Theatre is a design which fully utilizes all of the advantages of the new war-perfected Alnico 5 type of permanent magnet. The exclusive design of the new speaker in combination with the new type permanent magnet permits higher efficiencies at one-third the size and weight of material required for all other type magnets. It also provides a compact self-energized speaker which eliminates the need of separate field supplies.

Equally important is the feature of edgewise-wound, aluminum-ribbon wire in perfecting the voice coil. This new type aluminum-ribbon wire, treated with a temperature resistant varnish, greatly increases the efficiency by providing more conductor material in the magnetic circuit.

Another exclusive feature is the near perfect piston-like action of the metal diaphragm which increases the transmission speed of sound several times faster and is more sensitive than that of paper or fibrous materials. The tangential compliance of the hydraulically drawn diaphragm also increases the safety factor and sound reproduction abilities three times greater than ordinary annular compliant type diaphragms. The complete voice coil and diaphragm assembly is mounted in a cast Bakelite ring. Dowel pins assure perfect alignment. Impedance of the speaker is approximately 24 ohms over a wide frequency range when operating under normal conditions.

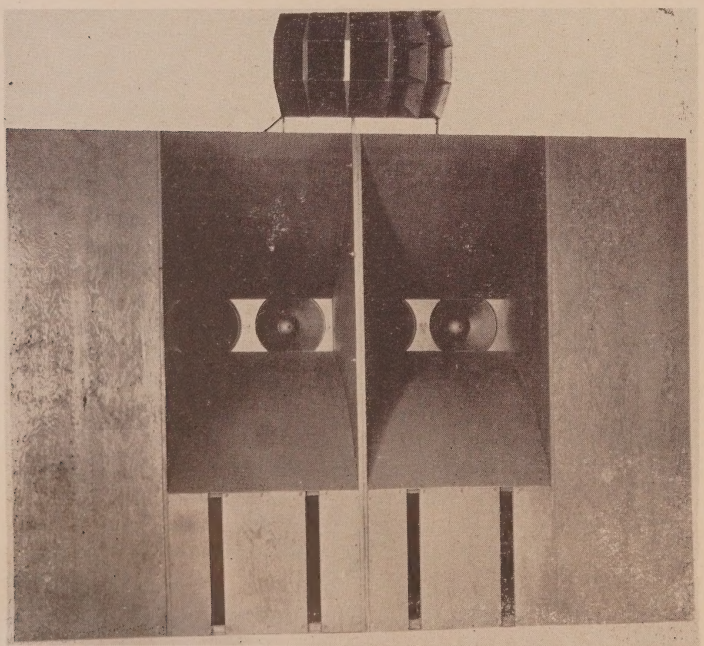
Low-Frequency Features

The low frequency horns of the Voice of the Theatre bring you great improvement in low frequency sound reproduction. Based on years of sound experimentation and scientific research, they have been designed and perfected by the nation's top flight sound engineers. They are unique in design, rigid in construction and perfect in performance. An airtight, fully enclosed rear section eliminates back stage reverberation and hangover another short straight air column increases presence. The exclusive vertical ports utilize all available sound energy and rigid construction perfects vibration-proof horn walls. These are a few more of the many features of the future you enjoy with your Voice of the Theatre.

For those who are technically and engineeringly minded, here are the exclusive low frequency speaker features which help make the Voice of the Theatre a great advancement in sound reproduction history. An important feature is the new design of the low frequency speaker which fully utilizes all of the advantages of the new war perfected Alnico 5 type permanent magnet. A compact, self energized speaker, its highly concentrated energy permits higher efficiencies than ever before thought possible with a permanent magnet. Design and use of this new type permanent magnet also perfects a speaker which is hum free in operation. It also provides cooler operating temperatures because of its elimination of separate field supplies.

Equally important is the exclusive feature of edgewise-wound, copper-ribbon wire used in perfecting the large 3-inch voice coil. Ribbon wire permits the

ALTEC-LANSING'S MODEL A-2 VOICE OF THE THEATRE



utilization of considerably more conductor material in the air gap, greatly increasing efficiencies and decreasing operating temperatures. The diameter of the edgewise-wound, copper-ribbon voice coil has been enlarged permitting utilization of higher power with less distortion.

Another feature of the low frequency speaker is the highly efficient dome-inserted, moisture resistant, seamless molded cone with effective driving area of 123 square inches. Cone and voice coil assembly are permanently aligned in a 15-inch die-cast frame and clamping ring. Impedance of the unit is approximately 20 ohms under normal operating conditions.

The Models

Model A1, Voice of the Theatre, provides deluxe presentation in large theatres. The six low frequency speakers provide an extended base reproduction and permit 100 per cent utilization of the complete frequency range as recorded on the sound track. Two high frequency speakers feed into a multi-cellular high frequency horn, which in turn distributes high quality sound evenly throughout the auditorium. Selected sizes of high frequency horns are used with this system, depending upon the architectural design and acoustical characteristics of the theatre.

Model A1-X, Voice of the Theatre, is exactly the same as Model A1, except that special high frequency horns and adaptors are provided so that four high frequency speakers can be used with properly selected multicellular horn.

Model A2, Voice of the Theatre, has been designed to provide deluxe presentations in theatres whose seating capacity does not exceed 2,800 seats. Four low frequency speakers provide an extended bass reproduction and permit 100 per cent utilization of the complete frequency range as recorded on the sound track. Two high frequency speakers feed into a selected type of multi-cellular horn providing even distribution of high quality sound throughout the auditorium. High frequency multi-cellular horn selected will depend upon architectural design and acoustical characteristics of your theatre.

Model A2-X, Voice of the Theatre, is exactly the same as Model A2, except that a special high frequency horn and adaptors are provided so that four high frequency speakers can be used with the properly selected multi-cellular horn.

Model A4, Voice of the Theatre, provides deluxe presentations in theatres whose seating capacity does not exceed 1,200 seats. A medium size speaker for medium sized houses, the two low frequency speakers of the Model A4 provide extended, true bass reproductions and permit 100 per cent utilization of the complete frequency range as recorded on the sound track. The high frequency speaker also delivers the same high quality sound as other models. And to provide perfect distribution of high quality sound throughout the auditorium, selection of the high frequency multi-cellular horn will depend on individual architectural and acoustical characteristics of your theatre.

Model A5, Voice of the Theatre, permits the exhibitor, whose theatre seating capacity does not exceed 750 seats, to keep pace with his bigger competitors. For although Model A5 is a smaller size speaker, it provides comparable high quality performance of the larger models. Model A5 has one low frequency speaker of the same type used in the larger models. The same high frequency speaker and high frequency multi-cellular horn as used in the large models assures 100 per cent distribution of high quality sound.

Model A6, Voice of the Theatre, is presented in illustration of the perfections that have been achieved in advanced methods of sound reproduction. By combining both high and low frequency speakers in a small compact speaker with a special network, all the features of the future are enjoyed in quality presentation. Model A6 is a special Voice of the Theatre speaker and is recommended for unusually small theatres and review rooms.

CENTURY PROJECTOR CORPORATION

During the latter phases of the war effort the engineering development of new sound reproducing equipment was again initiated.

Two new sound heads have been devised, together with associated equipment.

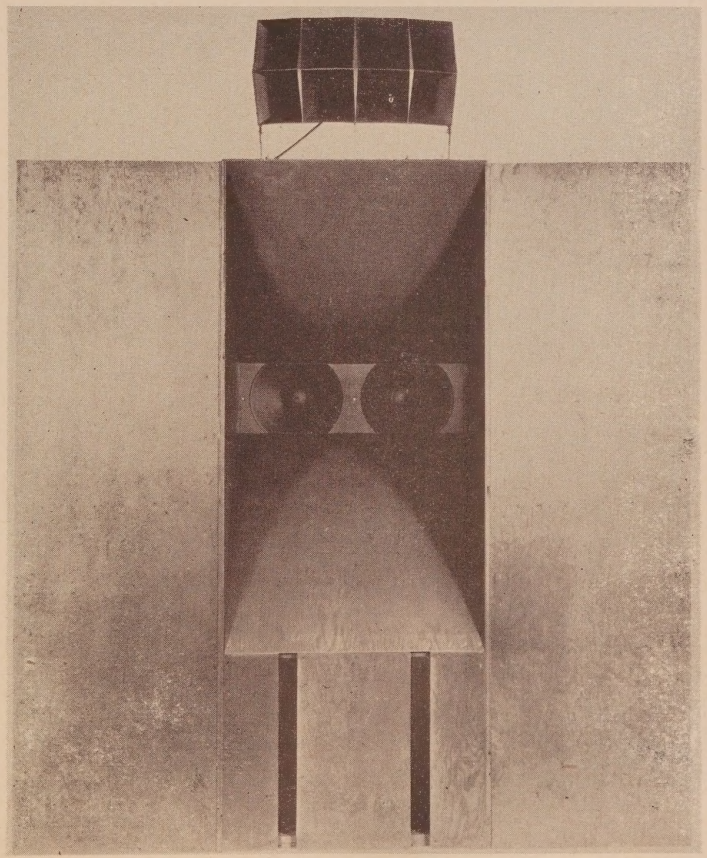
New principles of film stabilization were developed resulting in greatly improved flutter control, eliminating many of the undesirable, uncontrollable mechanical weaknesses of previous equipment. The new principle of operation employs loops of film under tension, between the sound drum and sound sprocket, controlled by a constant tension device with oil lamping.

Greatly improved sound reproduction has been demonstrated from the new equipment.

As a result of a planned program Century has, therefore, taken the second step toward a professional equipment designed for the reproduction of talking motion pictures with consideration for sturdiness of construction, freedom from mechanical failures, improved sound and picture quality, together with simplified designs for easier maintenance.

It is our prediction that the next step of this program may again provide the motion-picture industry with advances in designs not heretofore possible. New metals, new optics, new ideas are constantly being investigated in view of producing equipment worthy of assuming the responsibility of projecting the

ALTEC-LANSING'S MODEL A-4 VOICE OF THE THEATRE



product of our vast investment from Hollywood and the studios of the World.

While the Century Projector Corporation sells its Model R-2 and Model R-3 sound producers, with a complete line of replacement parts, it is also distributor for Century Standard sound system and the Century Master sound systems, which are identical, respectively, with the Westrex Corporation's Standard and Master sound systems developed for the foreign market. Century also distributes the Altec-Lansing Voice of the Theatre loudspeakers.

DeVRY CORPORATION

DeVry projectors have the sound heads incorporated in the mechanism as an integral part of the projector. This assures certainty of alignment at all times between the sound head components and the picture projector mechanism. No prisms or mirrors are involved in the sound optics, resulting in improved durability and elimination of distortion due to fogged or dirty reflecting optical faces. The fool-proof sound filter system is designed to maintain constant film motion at the scanning point—your guarantee of highest quality sound reproduction. Lateral guide roller permits delicate adjustment for all sound track limits.

DeVry amplifiers incorporate all the latest recognized developments essential for highest quality true-to-life, humless reproduction. All materials are of the highest quality obtainable for long trouble-free performance. All electrical components are easily accessible for quick servicing.

All of the DeVry amplifiers are designed for operation on 106-125 volts, 50-60 cycle alternating current. Amplifiers for operation on other than 50-60 cycle available only on special order.

The Number 7 high-fidelity auditorium amplifier has a rated power output of 18 watts at 2 per cent distortion—25 watts peak—flat response within 1 db. from 50 to 10,000 cycles. Built-in tone compensation, enabling both low and high frequency attenuation or accentuation. Built-in monitor speaker, d. c. field supply and dividing network. For use in conjunction with two DeVry 2900 pre-amplifiers. Complete with tubes. The Number 5 amplifier is identical to the Number 7, but less d. c. field supply and dividing network. The Number 2820 wall type, single channel 25-watt, auditorium amplifier, with a flat response within 1 db. from 50 to 10,000 cycles, is housed in an attractive, well ventilated metal cabinet. There is included built-in monitor speaker with independent volume control, two photo-electric cell inputs, microphone and phonograph inputs, separate wide range high and low frequency response controls. It is furnished complete wth all tubes. The amplifier can be removed completely from chassis for easy, quick servicing.

The Number 1977 dual channel amplification system utilizes two power amplifiers which can be operated in conjunction to deliver 50 watts or independently to deliver 25 watts. The flat response within 1 db. from 50 to 10,000 cycles show a very low percentage of distortion. Tone compensation enables both high-frequency and bass accentuation or attenuation. Each amlifier supplies B plus and filament current for two pre-amplifiers. Apparatus is furnished complete with tubes. Number 1977 is designed for use with two DeVry 2900 pre-amplifiers.

Pre-amplifier Number 2900 utilizes two 6J7 tubes. It has separate volume control and microphone input. For wall mounting near each projector, it is connected to sound-head by coaxial-type cable to shield minute currents from interference and line loss.

Number 3968 Booth Monitor is a 10-inch speaker mounted in metal cabinet with self-contained amplifier and volume control.

The 12000 series amplifier is also built on the same easy unit-service and replacement basis. Wiring and other electrical elements are as accessible, and the units are as readily removable and replaceable as is the projector-head.

The 12000 series sound-head incorporates a new type sound filter—a development which results in flutter reduction to less than 2/10 of 1 per cent. In addition, this new sound-filter functions as a free film fly wheel, with a reduction of strain, to a point where test loops of film have been run more than 2500 circuits without film damage. The new unit's photo-electric cell pre-amplifier is a complete unit, attached to the projector in such a way as to allow the very shortest length of cable possible between the photo cell and the first stage of the pre-amplifier, contributing materially to noise reduction.

The loud speaker systems supplied by DeVry are capable of reproducing sound over a wide frequency range—a range more than ample to take care of any sound film that may be offered for public showing. They will reproduce the original sound with a naturalness that will delight the most critical audience.

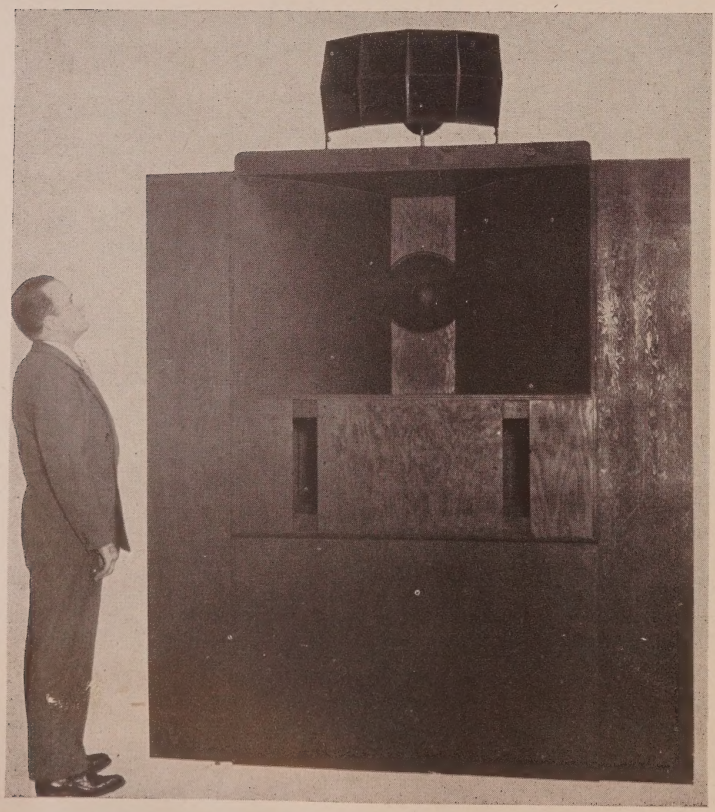
Every piece of DeVry equipment is thoroughly tested before delivery and the installations in the U.S.A. are supervised by DeVry's own field service engineers. And to maintain, year after year, the high quality standards of picture and sound DeVry has built into its equipment, these men are always at your call.

DeVry Number 1975 speaker is a high-fidelity, multi-cellular, d. c., filed coil speaker system, designed for use with the Number 7 amplifier which contains the dividing network and the d. c. field supply for excitation of both the high and low frequency speakers.

Also available is a P.M. multi-cellular speaker system (DeVry Number 1950) for use with the DeVry Number 5 amplifier.

The No. 2825 speaker is a high-fidelity, multi-cellular speaker system, utilizing two low frequency and one high fre-

ALTEC-LANSING'S MODEL A-5 VOICE OF THE THEATRE



quency speakers, designed for use with the Number 7 amplifier.

The No. 2826 speaker is designed for the largest of auditoriums, a multi-cellular speaker system utilizing four low-frequency speakers and two high-frequency speakers.

The No. 2815 speaker is a new development in dynamic speakers, utilizing a dispersion array, giving excellent frequency response over 60 degrees in a vertical plane—15 degrees in a horizontal plane—in front of the speaker, thus reducing beam effect of high requencies. Bass reflex cabinet gives excellent base reinforcement.

INTERNATIONAL PROJECTOR CORPORATION

There is a Simplex sound system specifically designed to meet the needs of medium and large theatres of every seating capacity. The engineering simplicity and the many standby features embodied in the design of these systems guarantees uninterrupted performance of the highest quality.

Four Star Sound Systems

The high standards created and maintained during the past 30 years enable users of Simplex Four Star sound to give their patrons the finest possible entertainment at a moderate cost.

Simplex Four Star sound in design and construction meets all the requirements of theatre owners for thoroughly modern equipment. It is so flexible it can readily accommodate dual track stereophonic recordings, push-pull and any of the proposed forms of the controlled track or other changes when approved by the motion picture industry. The quality of all Simplex systems is the same, and patrons of small theatres as well as large, can derive all the enjoyment which is the result of true sound reproduction.

The specifications shown herewith will permit theatre owners to meet their budgets and theatre requirements by installing the correct number of amplifiers to provide the proper output and equipment with the number and types of loudspeakers to supply capacity and distribution.

Specifications

The type E Simplex Four-Star rotary stabilizer sound heads have a 10-watt undistorted output. The monitor amplifier and monitor loud speakers have a 2-way permanent magnet speaker system with one high- and one low-frequency unit, one 1 x 3 exponential high-frequency horn and one low-frequency folded exponential horn.

The type A-15 Simplex Four-Star rotry stabilizer sound heads have d. c. excitation, 15-watt undistorted output, monitor amplifier, and monitor loud speaker, and a 2-way permanent magnet speaker system with one high-and one low-frequency speaker unit, one multi-cellular exponential high-frequency horn, and one folded exponential low-frequency horn.

The type A-30 Simplex Four-Star rotary stabilizer sound heads have d. c. excitation, with 30-watt undistorted output, monitor amplifier, and monitor loud speaker, as well as dual emergency volume control amplifiers, 2-way permanent magnet speaker system with one high- and one low-frequency speaker unit, one multi-cellular exponential high-frequency horn, and one folded exponential low-frequency horn.

The Type B-30 Simplex Four-Star rotary stabilizer sound heads have d. c. excitation, with 30-watt undistorted output, monitor amplifier and monitor loud speaker dual emergency volume control amplifiers, 2-way permanent magnet speaker system with two high-frequency and two low-frequency permanent magnet speakers, one multi-cellular exponential high-frequency horn with double throat and two folded exponential low-frequency horns.

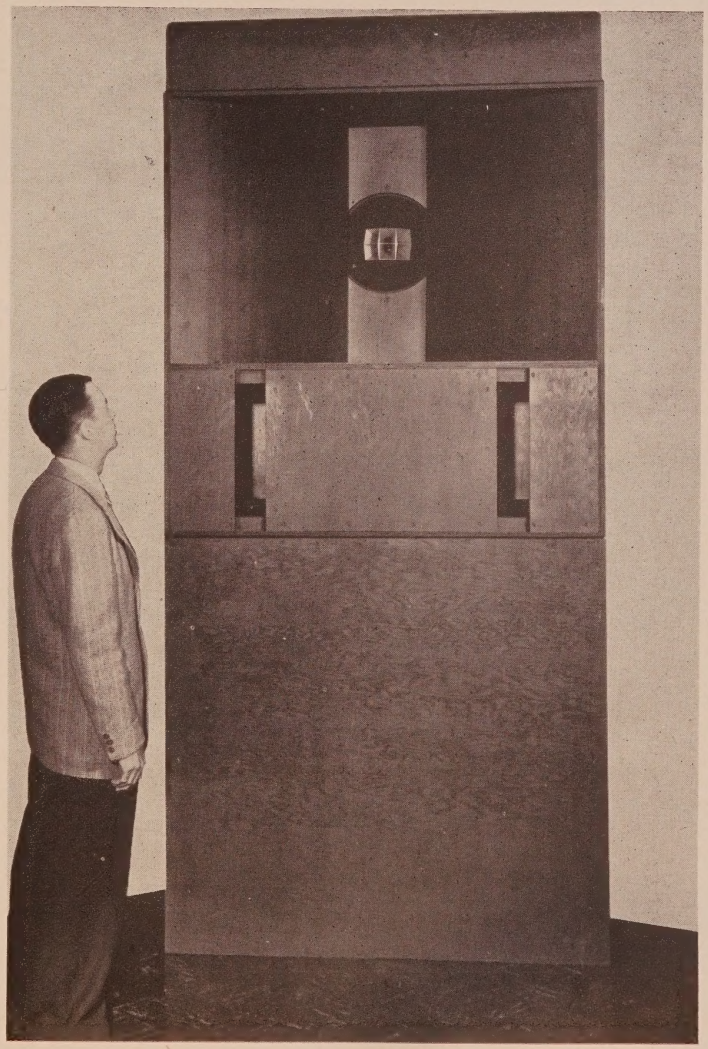
The Type B-60 Simplex Four-Star rotary stabilizer sound heads have d. c. excitation, 60-watt undistorted output, monitor amplifier and monitor loud speaker, dual emergency volume control amplifiers, 2-way permanent magnet speaker system with two high-frequency and two low-frequency permanent magnet speakers, one multi-cellular exponential high-frequency horn with double throat, and two folded exponential low-frequency horns.

The Type C-60 Simplex Four-Star rotary stabilizer sound heads have d. c. excitation, 60-watt undistorted output, monitor amplifier and monitor loud speaker, dual emergency volume control amplifiers, two high-frequency and four low-frequency energized speakers, one multi-cellular exponential high-frequency horn with double throat, and two folded exponential low-frequency horns.

Features

Film motion past the scanning light beam is controlled by the well-known rotary stabilizer principle.

ALTEC-LANSING'S MODEL A-6 VOICE OF THE THEATRE



The pre-focused exciter lamp of new design has a short sturdily supported filament minimizing vibration. The exciter lamp bracket is easily removable and designed to permit vertical and lateral adjustments for exact positioning of filament. The exciter lamp compartment is well ventilated and careful shielding prevents any stray light from entering film compartment.

The highly efficient oil-proof optical system is designed for protection against soiling.

The photo-electric cell vertical mounting eliminates microphonic noise, and is completely out of way when threading film. It is easily accessible for cleaning or replacement, less susceptible to static disturbances from film, gears, or take-up belt and well shielded against stray light. It is impossible for oil to reach and saturate connecting wires and socket which are well protected and shielded in photo-cell arm casting.

Lateral film guide and pressure roller equipped with trigger control for easy operation.

The drive motor, cradle suspended, is an over-size, one-quarter horsepower split-phase induction motor, with ball-bearing-mounted rotor, insures constant speed with variation of less than 0.5 per cent with voltages from 105 to 125 volts. Flywheel of proper design insures correct starting speed.

Film drive sprockets, sound and hold-back, are included. All shafts of drive mechanism rotate on dust-proof ball bearings.

The drive mechanism is one assembly, easily removable as a single unit by removing four screws.

A sight oil gauge gives immediate and positive visual indication of oil level in reservoir, insuring proper lubrication of sound mechanism if oil level is maintained.

Sound-head design insures accurate alignment of projector drive gears and easy installation or removal of projector mechanism.

The cabinet of the volume-control amplifier. neat and compact, permits mounting on front wall of projection room to avoid vibration. It may be partially recessed in wall for concealment of wiring.

Volume control for system is a special design, de-tented step-by-step potentiometer having 19 2-db. steps.

Two-stage resistance coupled voltage amplifier employing 6J7 tubes has a 46 db. gain. Normal operation is at 26 db. The metal Type 6J7 tubes were selected for inherent shielding, uniformity and freedom of microphonic tendencies.

Electronic sound change-over comprises a three-way switching arrangement, one at each projector station, to control bias of second stage of volume control amplifier. This method of change-over control is instantaneous and noiseless since it avoids the necessity of breaking the signal circuit. Switching may be made at either projector. The exciter lamp circuit is simultaneously transferred in the change-over operation.

Photo-electric cell balances equalize the signal input to the power amplifier.

Dual amplifier units with single shaft, operating both volume controls in unison, can be accommodated. This provides for emergency operation or dual track reproduction.

Post-equalization. Design provides for incorporation of post-equalization facilities to properly reproduce special pre-equalized recordings at such time as they may be generally released.

Co-axial cable of special low-capacity couples photo-electric cell output to volume control amplifier. Low capacity shielded cable connects volume control amplifier to power amplifier

In the main amplifier equipment, the power transformer mounted on each amplifier chassis is oversize to render continuous service on 50 or 60 cycles and tapped to compensate for various line voltages of 105, 115, and 125 volts.

Amplifier frequency characteristics. Warping adjustments permit variations in the low frequency and high frequency response characteristics, to match various loudspeaker characteristics and equalize for theatre acoustic conditions.

Loudspeaker network, with 400 cycle cross-over couples amplifier output to the two-way loudspeaker system. Special design features, careful selection of capacitor, resistors, and other parts afford stability of operation under all conditions.

Loudspeaker network control panel incorporates switches for speaker testing and emergency operation on low frequency speakers only.

Amplifier switching facilities are provided to permit isolation of an inoperative amplifier from the signal circuit without disconnecting from power supply.

Compact, sturdy construction throughout minimizes space, simplifies installation, and reduces maintenance cost. All parts on special mountings easily removable to facilitate servicing.

Genuine two-way loudspeaker system supplied with all Simplex Four Star sound equipments to assure highest quality reproduced sound and uniform distribution, covering every seat in theatre, without distortion due to overload.

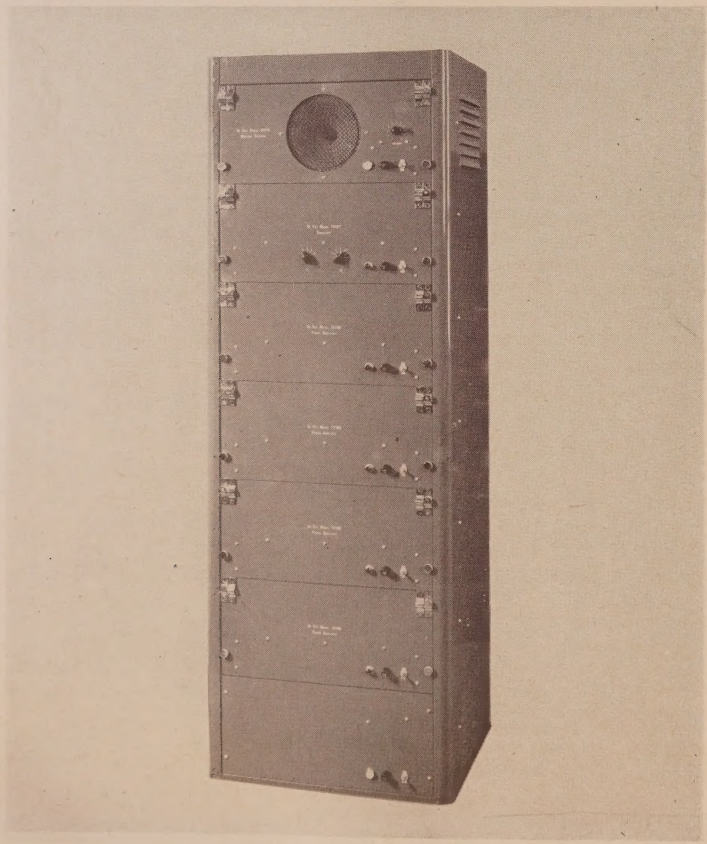
High-frequency loudspeaker has a genuine multi-cellular exponential horn. The low-frequency has folded exponential horns of wood construction throughout. Driving units are of high power-handling capacity and efficiency.

The design of the monitor loudspeaker Type LU-100 is a definite step toward extension of the frequency response over that generally found in monitor speakers.

Monitor amplifier type AM-107 provides power to drive the monitor loudspeaker.

Exciter lamp operation on alternating current is possible in the event of failure in the rectifier system regularly supplying direct current.

DeVRY'S 12,000 SERIES AMPLIFIER RACK



MOTIOGRAPH

Motiograph-Mirrophonic sound equipment is available in the following five models:

Model M-11, designed for theatres up to 750 seats.

Model M-9-B, designed for theatres up to 1,000 seats.

Model M-911, designed for theatres up to 1,000 seats.

Model M-11 Dual, designed for theatres up to 1,450 seats.

Model M-911 Dual, designed for theatres up to 1,900 seats.

In establishing the above maximum seating ratings, Motiograph has followed the recommendations of the Research Council of the Academy of Motion Picture Arts and Sciences. It has been our experience, however, that the loudspeaker systems we furnish are so far above the average in efficiency that there is ample justification for using these systems in theatres with greater seating capacity.

In Motiograph-Mirrophonic sound systems power amplifiers are measured at 2 percent distortion, with d.c. excitation in all models—not just in more costly models. Electro-dynamic speakers are included in all models as are first quality sound reproducers and matched loudspeaker and amplification systems for perfectly balanced sound.

In the sound reproducer both exciter lamps light at once, giving full brilliance at changeover. The oil shield and drainage system do not let oil get on the sound lens. Helical cut drive gears outwear the worm drive type. Steel and bakelite gears are used throughout, no soft iron or bronze gears being used. Pre-focused exciter lamps allow for instantaneous changeability. Low speed sound sprocket is a protection against flutter. Double pad rollers assure smoother operation. Laminated felt impedance rollers result in low flutter, long, even wear. The rotary stabilizer gives full protection against flutter. Shockproof drive isolates intermittent movement action. For the side-mounted nontilt motor, no thrust bearings are required. Flutter content is well below Academy limits.

In the loudspeaker system, electrodynamic speakers are used throughout, not those of the light-duty permanent magnet type. Non resonal metal high-frequency horn—gives perfect distribution. Full-size low-frequency horns and baffles complete the tonal range.

All Motiograph-Mirrophonic Sound Systems produce the same high quality sound reproduction. The five models vary only in the amount of amplification and loudspeaker equipment furnished. Thus the purchaser of the smallest Mirrophonic System can obtain the same quality as the purchaser of the largest system in the line.

The Motiograph-Mirrophonic line is extremely flexible and is so modern in construction and design that each model is adaptable for the reproduction of any of the proposed forms of dual or control track recording.

A Motiograph-Mirrophonic sound system gives the most natural, lifelike sound ever heard, with heretofore unobtainable delicate shadings of voice, and quality of musical reproduction never before approached. The loudspeaker systems afford the best balanced and the most complete tonal range, with uniform sound distribution throughout the theatre.

Next to quality of reproduction, reliability in operation is most important. All Motiograph-Mirrophonic sound system components are, therefore, designed to give the acme of trouble-free service and can be expected to have unusually long life.

Pre-Amplifiers (Voltage Amplifiers)

The PA-7505-A pre-amplifier (voltage amplifier) is standard equipment in Models M-9-B, M-911 and M-911 Dual, is Motiograph designed and built and utilizes three low cost vacuum tubes. Individual amplifier tubes are provided for each reproducer. The preamplifier has a single master volume control with auxiliary facilities for balancing reproducer outputs. The changeover switch and volume control are of the highly reliable commutator type. This preamplifier is intended to be located in a control cabinet, mounted between the projectors on the front wall of the booth. These cabinets have as associated equipment, extension rods, couplings and knobs, so that changeovers and volume can be controlled from either projector operating position.

The TA-7466-A pre-amplifier (voltage amplifier) standard equipment in Models M-11 and M-11 Dual is Western Electric designed and built and utilizes three Western Electric 310-B vacuum tubes. Individual amplifier stages are provided for each reproducer. These stages include volume control units for exactly balancing reproducer outputs. Reproducers are coupled to the preamplifier by special coaxial cables which thoroughly shield minute sound currents from interference of all kinds. This preamplifier is intended to be located in a control cabinet, mounted between the projectors on the front wall of the booth. These cabinets have as associated equipment, extension rods, couplings and knobs so that changeovers and volume can be controlled from either projector operating position.

Power Amplifiers

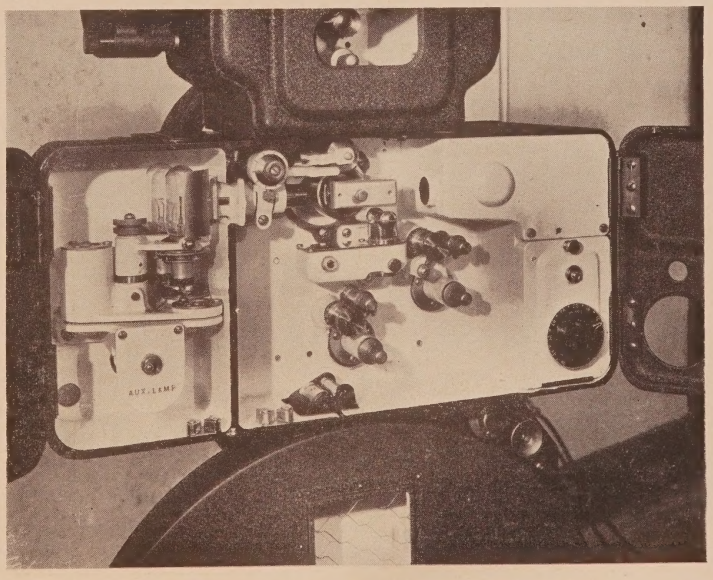
The MA-7505-A 20-watt power amplifier furnished in Models M-9-B, M-911 and M-911 Dual utilizes low cost vacuum tubes. Its mechanical design provides exceptional accessibility of all components. The electrical circuit is of the resistance coupled feed-back type. A separate amplifier tube is provided for monitor speaker operation. In Models M-9-B and M-911, one MA-7505-A 20-watt power amplifier is furnished and Model M-911 Dual has two rack mounted MA-7505-A 20-watt power amplifiers operating in parallel to give 40-watt power output.

The switching panel supplied in Model M-911 Dual affords facilities for operating either amplifier alone in the event of emergency.

The TA-7467-A 15-watt power amplifier furnished in Models M-11 and M-11 Dual inclusive of the Motiograph-Mirrophonic Sound System line, is designed, engineered and built by Western Electric Company. The TA-7467-A 15-watt power amplifier is entirely self-contained and compact in the extreme and its mechanical design is such that all component parts are easily accessible. Each power amplifier utilizes: 3 Western Electric 310-B vacuum tubes, 2 Western Electric 300-B vacuum tubes, 1 Western Electric 274-A rectifier tube, and 1 Western Electric 336-A monitor tube.

Any vacuum tube in this amplifier may easily be checked by operating a rotary selector switch, part of the self-contained tube test set. Tube conditions in percent of normal are indicated on the panel meter. All the vacuum tubes are mounted on the top side of the chassis. In this

CENTURY PROJECTOR'S MODEL R-2 REPRODUCER



way the wiring is immediately accessible without moving the chassis from its normal position which is with the open side to the front of the cabinet. The test meter, switch and monitor volume control are located on a small panel on the front of the amplifier.

The power amplifier setup of Model M-11 Dual, mounted on the rack from top to bottom, include TA-7467-A 15-watt power amplifier No. 1, SE-7512 amplifier switching panel, and TA-7467-A 15-watt power amplifier No. 2.

Model M-11 Dual has two TA-7457-A 15-watt power amplifiers operating in parallel to give 30 watts of power output. The switching panel supplied affords facilities for operating either amplifier alone in the event of emergency.

Model M-911 Dual has a similar rack and emergency setup, but has two Motiograph MA-7505-A power amplifiers operating in parallel to give 40-watts of power output.

Power Supply Units

In Models M-9-B, M-911 and M-911 Dual, a Motiograph built power unit, SE-7520, is utilized. This unit utilizes two of the new highly efficient mercury vapor rectifier tubes. The chassis type design is similar to that of the Western Electric power amplifier resulting in exceptionally easy installation, good accessibility and adequate ventilation.

In Models M-11 and M-11 Dual the Western Electric built TA-7471 power unit is utilized. This unit is designed for extreme reliability of operation and low maintenance cost. Western Electric 288-A vacuum tube rectifiers are used and the filtering is such as to give the pure d.c. required for highest quality sound system performance. The vacuum tube sockets are so arranged as to permit instantaneous change of tubes. A special ballast lamp effectively maintains the exciter lamp current constant regardless of line voltage changes.

Mirrophonic De Luxe SH 7500

The Mirrophonic de luxe reproducer is standard in the Motiograph-Mirrophonic line.

Among the important features is the use of only one large precision machined 32-toothed sprocket which runs at half the speed of the conventional sound head sprocket. The lesser r.p.m. of this sprocket tends to pull the film over the stabilizer evenly, giving smoother action, eliminating possible film vibration and providing protection against flutter. This single sprocket makes for extreme simplicity of threading and results in an exceptionally roomy sound head.

The impedance roller is designed to give proper compliance of the film around the stabilizer drum under all conditions of film shrinkage.

The rotary stabilizer, with its enclosed flywheel operating in a specially developed liquid, imparts to the travel of the film a remarkabe steadiness and results in a flutter content well below any other reproducer available.

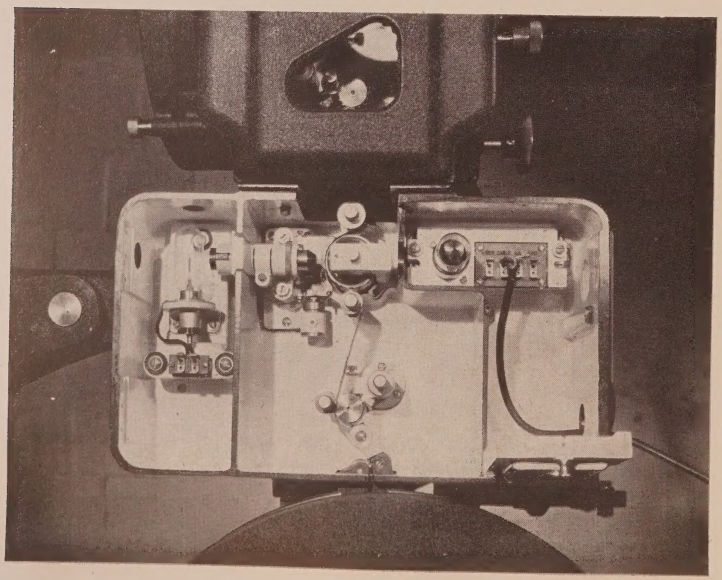
The sprocket and guide roller, the shafts and the four sturdy extra-wide gears are machined with exacting precision of workmanship. All shafts operate on ball-bearings. This assures long life and the acme of silent operation so necessary to the reproduction of true, living sound.

The constant speed direct-drive motor is mounted in a central position on one side of the reproducer and regardless of the projection angle, the drive shaft operates horizontally. Because the motor fits snugly on a rigid table against the side of the reproducer and near the natural center of gravity of the projector, the entire assembly is stable, proper lubrication without leakage is assured and no thrust bearings are required.

The side mount also permits connecting the motor to the reproducer through a simple flexible coupling. A silent link chain couples the reproducer and the projector mechanism. The chain drive isolates the intermittent action of the projector mechanism from the reproducer, thus giving the maximum of stability and smooth, quiet operation.

The design of the motor offers protection against excessive motor current occasioned by abnormal or mechanical overload line voltage through an "overload sentry" which automatically functions as a circuit breaker when needed. The starting time of the motor is such as to conform to the recommendations of the Academy of Motion Picture Arts and Sciences for motion picture projector service.

CENTURY PROJECTOR'S MODEL R-3 REPRODUCER



Loudspeaker Equipment

The loudspeaker system furnished in Model M-9-B is especially designed and consists of:

(1) High frequency 5-cell multi-cellular horn
(1) Electro-dynamic high frequency unit
(1) Electro--dynamic 18" low frequency unit
(1) Baffle and bass-reflex cabinet
(1) Crossover filter network with adjustable high frequency channel attenuator
(1) Monitor speaker.

The multi-cellular horn is rigidly constructed of cast metal alloy and is designed and built so that with only five primary cells, performance equivalent to a 12-cell assembly is achieved. The horn efficiently distributes high frequency sound energy over a solid angle 90 degrees horizontally and 45 degrees vertically.

The electro-dynamic high frequency unit is of the metal alloy diaphragm, sound chamber type. It employs a small rugged narrow annular type diaphragm much stiffer than the more conventional spherical or dome type diaphragm. Speech reproduction is crisp and clear without having a hard or metallic quality. The whole unit is ruggedly constructed and designed for maximum life expectancy. This unit has given such extreme satisfaction in the field, it is used in varying numbers in all Motiograph-Microphonic models including the most costly.

The electro-dynamic 18-inch low-frequency unit is particularly designed for operation with the associated equipment and is the most highly efficient low frequency speaker available.

The low frequency baffle consists of a ruggedly constructed cabinet containing the electro-dynamic 18-inch low-frequency unit. The design of this cabinet incorporates the famous bass-reflex principle. Large wings associated with the cabinet further improve the low frequency response characteristics of the combination.

The loudspeaker system furnished in Models M-11, M-11 Dual, M-911 and M-911 Dual is especially designed for the medium sized theatre and consists of: one high-frequency 32-cell multi-cellular horn with 90-degree horizontal and 45-degree vertical coverage, one electro-dynamic high frequency unit, two electro-dynamic 15-inch low-frequency units, one folded horn, one crossover filter network with adjustable high frequency channel attenuator for mounting inside low frequency folded horn on stage, and one monitor speaker. (In models M-911

and M-11 Dual, two electro-dynamic high frequency units and a double horn throat are furnished to accommodate the paralleled output of the two power amplifiers in these models. This also gives a highly desirable emergency feature.)

The high frequency horn furnished with this speaker system has 32 cells. This multi-cellular horn is of superior type in respect to the requirements for efficiency and for the widest and most uniform distribution of sound energy. Physically, this horn incorporates entirely new design and construction practice. It consists of an assembly of individual primary cells bolted together at their open ends and securely held in a die cast common throat at the other ends. Each primary cell is then divided into four compartments. The primary cells are non-resonant zinc alloy die castings insuring strong physical properties and a light but rigid assembly.

The two 15-inch electro-dynamic low frequency speakers furnished in the loudspeaker assembly are newly designed and offer excellent performance ability and efficiency. The use of two speakers gives an excellent emergency feature in addition to providing better bass response.

The low frequency folded horn employed in this loudspeaker system contributes heavily to the high efficiency, wide coverage and overall excellent performance of the complete loudspeaker system. Provision is made in the folded horn to accommodate the two 15-inch low frequency speaker units and the cross-over filter network.

The crossover filter network is provided with an adjustable high frequency channel attenuator so that the level of output may be varied to suit the particular needs of the installation. The cross-over frequency of this network is 400 cycles per second.

RADIO CORPORATION OF AMERICA

Good sound reproduction must be achieved if present-day critical audiences are to be satisfied with moving picture theatre programs, and good sound reproduction will result only when each of its contributing factors is designed so that it will play its part most efficiently in helping to create sound of pleasing fidelity. From the sound track on the film to the acoustics of the auditorium, each element must not only perform its own function without introducing appreciable distortion or noise, but it must pass the signal to the next unit in the chain efficiently and with full regard for the characteristics of the next unit.

One of the major advancements toward high-fidelity sound is the RCA rotary stabilizer type of soundhead. That it has overcome noticeable flutter, or pitch variation, has been proved not alone in the laboratory but in its wide use in theatres. A sustained note, like one from a piano, is reproduced as it originally sounds, and spoken words are heard clearly and distinctly.

Yet the rotary stabilizer is only one of several features of sound-head construction which combine to make possible better sound reproduction.

The mounting of the exciter lamp, optical system, photocell, and scanning drum as a separate, shock-insulated unit inside the main soundhead case prevents these important parts from receiving and transmitting normal soundhead vibration. Hence, film passes smoothly through the light beam. Furthermore, the exciter lamp filament and the photocell elements, being free from jar, do not introduce microphonic noises into the sound.

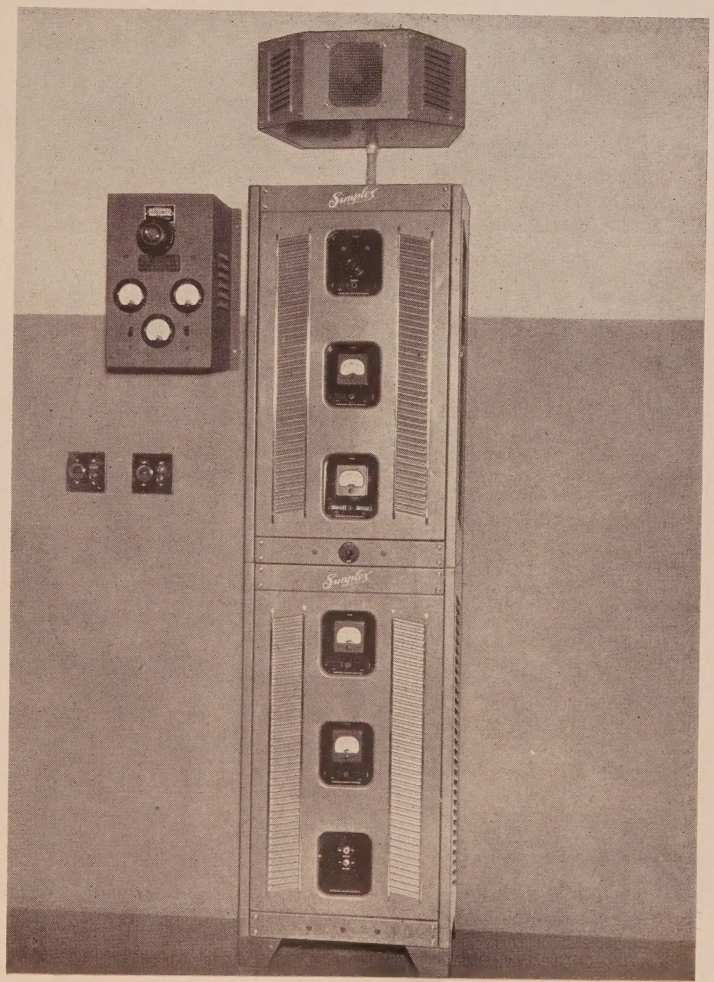
A factor of importance is the method of driving the picture projector; if it is driven from the sound sprocket shaft, any vibration or variation in projector speed and load will tend to cause comparable vibrations, or changes in speed, in the sound sprocket.

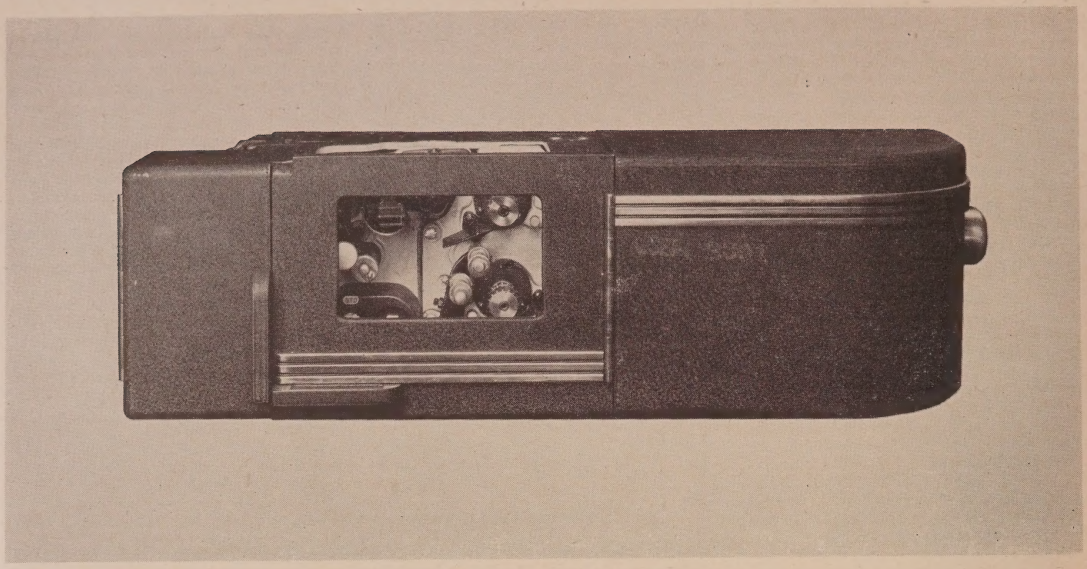
A refinement found only in the RCA deluxe soundheads is that of shockproof drive. This mechanical device is so constructed that irregularities of drive of both the picture projector and the lower take-up mechanism are carefully excluded from the constant speed sprocket shaft of the soundhead by driving these from the soundhead hold-back sprocket shaft. Any variations are thus filtered out mechanically without reaching the independent constant speed shaft. This refinement results in higher quality more uniform sound, particularly when lower take-ups and picture projectors become faulty and irregular through continued use.

If the film is pulled through the light beam directly by the sound sprocket (as it is in some soundheads), those vibrations or speed changes are transmitted to the film, and immediately cause characteristic distortion. The seriousness of this condition is eliminated in the rotary stabilizer soundhead, because the film speed is controlled mainly by the stabilizer, with a loose film loop between it and the sound sprocket.

The use of ball-bearings on all soundhead shafts insures good, steady operation for a long period of time, there being negligible wear to affect the normally smooth operation of the soundhead. All soundhead drive gears operate in an oil

INTERNATIONAL PROJECTOR'S AMPLIFIER RACK AND MONITOR





RADIO CORPORATION'S SOUNDHEAD

bath, to insure smooth operation and long life.

The medium used to carry the sound signal from the soundhead to the amplifier is also important. Either low-capacity cable coupling or transformer link coupling, both standard methods, may be used. When low-capacity cable is used, its capacity must be kept at an extremely low value, which is done by making it short and of a length calculated to provide the maximum transfer of power from photocell to the amplifier. If transformer link coupling is used, the photo cell transformer in the sound-head and the input transformer in the amplifier must be matched to each other very carefully, or distortion and loss of sound power will result.

Amplifiers

The most flexible components in the whole sound system are the amplifier, or amplifiers, yet they are nonetheless critical in design. Their flexibility allows easy adjustment of sound quality to suit the particular auditorium in which the sound is delivered, and enables the designer to compensate for the fact that no known loudspeaker system can reproduce all sound frequencies with equal loudness when receiving a constant amount of power.

RCA amplifiers are matched to the loudspeakers with which they are used, and by designing the amplifier to give increased output at frequencies at which speaker efficiency is low, sound of approximately equal loudness at all frequencies is reproduced. Proved in wartime equipment, and incorporated in all RCA theatre sound systems now being manufactured, are high-fidelity amplifiers using inverse-feedback circuits which stabilize their amplification and virtually eliminate amplifier distortion.

To permit high output from an amplifier, special types of tubes were formerly necessary, but because of the great variety of highly efficient tubes available today, that condition no longer prevails. Today's amplifier gives better quality and higher power, while using tubes which are obtainable from any good radio store. Tube replacement is thereby greatly facilitated, and at nominal cost.

Loudspeakers

Loudspeakers, the remaining portion of a sound system, have been the subject of many major changes since the advent of sound in theatres. The latest improvement is the replacement of the heavy, bulky, power-consuming loudspeaker field magnet by a permanent magnet made of an alloy of aluminum, nickel, cobalt, and iron. This material, developed just before the war, and improved during it, has proved itself sufficiently strong and permanent to replace the wire-wound fields previously used, while at the same time making possible increased speaker efficiency.

Two resulting features, which are attractive because of their cost-saving nature, are the continual saving of electric power, and lower installation expense. This double saving arises from fact that it will no longer be necessary to install the two or more wires required from the booth to the stage for the older type speaker fields. In addition two possible sources of trouble are avoided by the elimination of the speaker field winding and its associated power supply unit.

Two-way speaker systems have been standard equipment in all high-quality motion picture sound reproducing systems for some years. RCA two-way systems are matched to provide smooth, balanced sound. No power-wasting resistor networks are used.

Background noise is minimized by careful design of the high-frequency units, which incorporate a mechanical "cutoff filter" to eliminate film scratch, amplifier hiss, and other very high-frequency noises above the recorded sound range. Their inherent full, yet mellow, tone brings out the richness in any recording without emphasizing any defects of possible poor recordings. Their 400-cycle crossover frequency permits crisp, clean speech reproduction without noticeable shifting between the high- and low-frequency speakers.

The speaker units themselves are designed to permit field replacement of cones: they do not need to be returned to the factory for repair. Clearances between cone supports, cones, voice coils, and air caps are ample to permit long-continued operation in the presence of inevitable backstage dust. Furthermore, large amounts of power, such as occur in battle scenes, explosions, etc., cannot cause the voice coil or cones to rub or distort.

The speakers are fed from the amplifier by a 250-ohm line. The crossover network, and the line itself is inherently low-loss.

Three high-frequency horns are available, permitting a proper match of sound distribution angle in any theatre, whether wide or narrow. Thus, all parts of the theatre are adequately covered with sound, without loss to the side walls.

The low-frequency baffle, with its scientifically correct, slow rate of taper, and its enormous effective mouth area, reproduces even the lowest tones with remarkable clarity and efficiency.

These various units are assembled into six different sizes of speaker assemblies, to match the auditorium of any theatre, whether large, small, wide, or narrow.

The position of the high-frequency and low-frequency speakers in relation to each other must be such that the sounds which come from both will be "in step" and free from overlap and fuzziness. To minimize loss of sound, the high-fre-

quency speaker should be as close to the screen as possible, and because of the necessary placing of the one in relation to the other, the whole speaker assembly must be so placed as to accomplish that necessary proximity of the high-frequency speaker to the screen. It will be obvious from this that the proper location of the speakers at the time of installation is of utmost importance.

Sound Quality

Sound quality at the listener's ear will be affected by two more factors; echo and reverberation time (multiple echoes) in the auditorium. Sound delivered to an auditorium is gradually absorbed by the walls and by whatever objects may be present. If that absorption occurs too rapidly, the sound will seem lifeless, while if it occurs too slowly, one sound will not be absorbed before the succeeding sound is delivered and one overlaps the other, blurring both. A similar condition will result if one sound reaches the listener directly from the speakers and a fraction of a second later the same sound reaches him as an echo from some other point in the auditorium.

That condition, if serious, can be corrected only by locating and properly treating the reflecting surface. However, if the effect of reverberation is not excessive, it may be possible to compensate for it by adjustment in the amplifier, since it usually is more troublesome at some one frequency, or band of frequencies, than at others. Such an adjustment should be made by the engineer who supervises the installation.

The logical conclusion which derives from all these facts is—maximum sound quality can be attained only by closely coordinating all the factors involved. RCA sound systems are designed and manufactured with this end clearly in mind, and with a view to providing a product which may be expected to give natural, lifelike reproduction, for the longest time, and with the lowest possible upkeep expense.

WESTERN ELECTRIC COMPANY
(Westrex Corporation)

Westrex Master

New and post-war, the Westrex Master is the finest sound system ever offered to the world's motion-picture industry by the Westrex Corporation. On every count—sound quality, simplicity, durability, and style—it is far ahead of pre-war theatre systems.

The Westrex Master makes good use of new ideas and component parts developed by intensive wartime research in Western Electric's greatly expanded laboratories and manufacturing plants.

Improved methods of controlling the movement of film, better amplification of the energy picked up by the photoelectric cell, and improved conversion of the electrical energy into acoustic energy—these are some of the features which make it outstanding.

These mechanical and electrical improvements made the equipment more durable and dependable. They deliver to the ears of theatre patrons a quality and quantity of sound such as they have never heard before. Here, briefly are some of the new features of the Master.

A hydro flutter suppressor which reduced mechanical flutter to less than one half of the industry's standard.

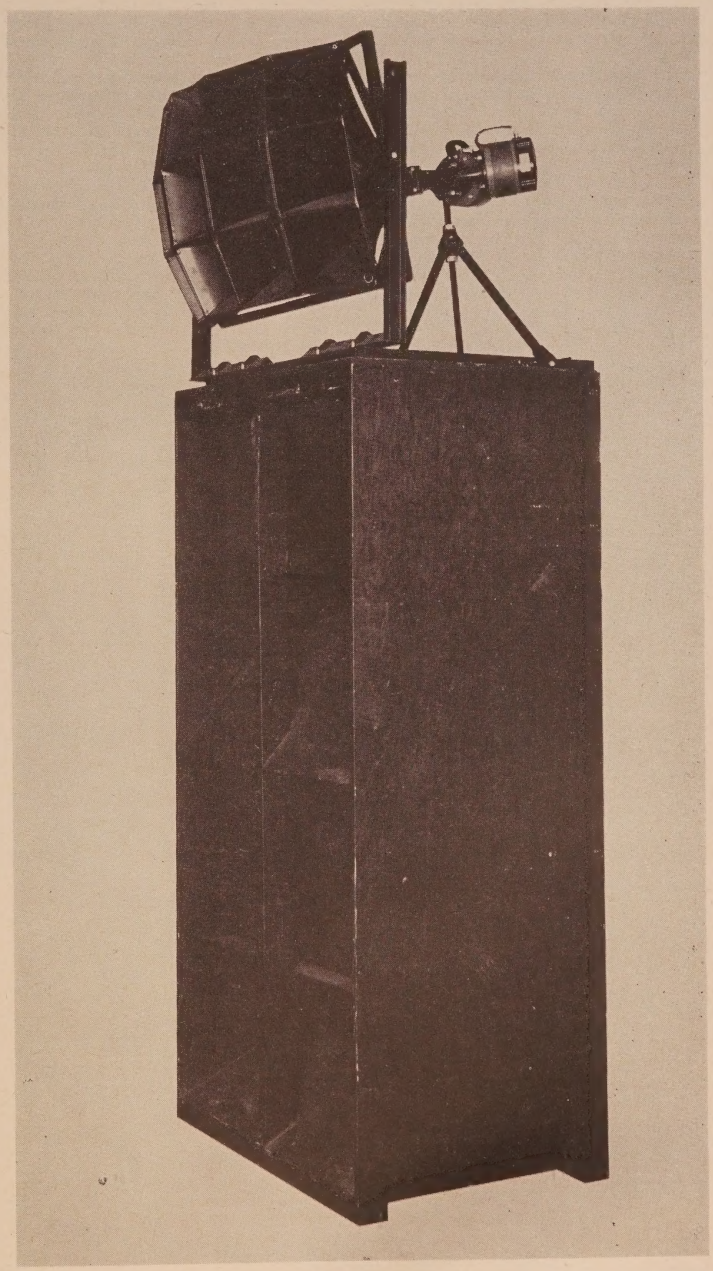
A built-in pre-amplifier which has been reduced to a fraction of the former size. For these two features alone, the alert exhibitor is going to want the new Westrex Master—but in addition he will receive many other advantages.

An electro-tension governor which provides electro-magnetic control of film speed to compensate for fluctuations in motor and sprockets.

An equilight diffuser which helps to reproduce every sound track, whether variable density or variable area, with maximum efficiency.

A film alignment control which makes certain that the track and light beam

RADIO CORPORATION'S SPEAKER



are in line at all times during operation.

A hand brake which provides a means of bringing the motor, projector, and reproducer mechanism to a quick, smooth emergency stop.

Notice the improved and simplified sound changeover, volume control, vertical drive motor, flexible coupling, straight line, drive, and hand wheel for easy threading.

The Westrex Master has been designed so that the future probable developments from Hollywood—such as automatic volume control and multi-track or stereophonic sound—can be added without extensive and expensive factory modifications.

The Westrex Master sound system can be used with any standard make of projector.

In the Westrex Master, the pre-amplifier is small enough to fit in the hand. The entire unit is placed in the reproducer next to the red-sensitive photoelectric cell.

This built-in feature is a long step forward from sound systems in which the pre-amplifiers are located some distance from the projectors. By discarding the old wall-style pre-amplifiers, special wiring and expensive coaxial cable are eliminated.

With the pre-amplifier and photocell placed close together, line losses and noise pick-up are generally reduced. As further protection against unwanted sounds, both the photocell and the pre-amplifier are shock mounted and separated from the reproducer housing.

Basic to the Westrex Master pre-amplifier's smaller size are the miniature electronic tubes that are used. These war-developed tubes are not much larger than the end of one's little finger, but, in spite of this small size, they are powerful and highly efficient. Their practical value has been established by extensive wartime use in radio receivers and transmitters for air craft, battleships, and submarines. These tubes—heart of the Westrex Master pre-amplifier—are not specialized and are obtainable through regular commercial channels.

The pre-amplifier and all other main parts of the Westrex Master are unit assemblies, so that any unit can be removed by loosening a few screws.

The Hydro flutter suppressor is Western Electric Export's feature solution to one of the most vexing problems in sound reproduction: mechanical flutter, an irregular movement of the film as it passes the scanning beam.

When mechanical flutter is excessive, it is easily and unfavorably noticed by the theatre audience. It makes the reproduction distorted and unnatural and robs the sound of vibrant, life-like quality.

Scientific electrical tests prove that the hydro flutter suppressor does a better job of solving the flutter problem than previous methods. Latest standards for the industry—set by the Academy of Motion Picture Arts and Sciences—state that flutter should not be more than 0.15 percent, and most pre-war reproducers had difficulty in meeting this standard. By using this hydro flutter suppressor, new Westrex Master sound system has a flutter factor of only 0.07 percent, or less than one-half of the standard set for the industry. Suppression of flutter to this new low level adds a depth and realism to the sound that is impressive.

The hydro flutter suppressor is a simple mechanical device, with little to get out of order or to require maintenance. Located near the impedance drum, the suppressor operates on a hydaulic principle. A lever arm with ball-bearing movement moves up and down in a special damping fluid within carefully controlled limits.

In normal operation, minute variations in sprocket speed may add extra slack or tension to the loop of film around the drum. Whenever this happens, the suppressor goes into action to hold the film tightly against the drum with a firm even pressure and the problem of mechanical flutter disappears.

The Westrex Master power amplifier delivers 40 watts with harmonic distortion of less than 2 percent. There are no cumbersome racks or fancy cabinets, which add to the cost but contribute nothing to the amplification of sound.

The Westrex Master amplifier is the culmination of 30 years of experience by Western Electric in pioneering and perfecting amplifiers.

This amplifier operates on a negative feedback principle, developed by Western Electric and the Bell Telephone Laboratories. It delivers 40 watts of electrical energy for the smallest Westrex Master system, in contrast with 15 watts for the smallest pre-war Mirrophonic Master system which is now superceded. With special tubes, the Westrex Master power amplifier delivers 50 watts.

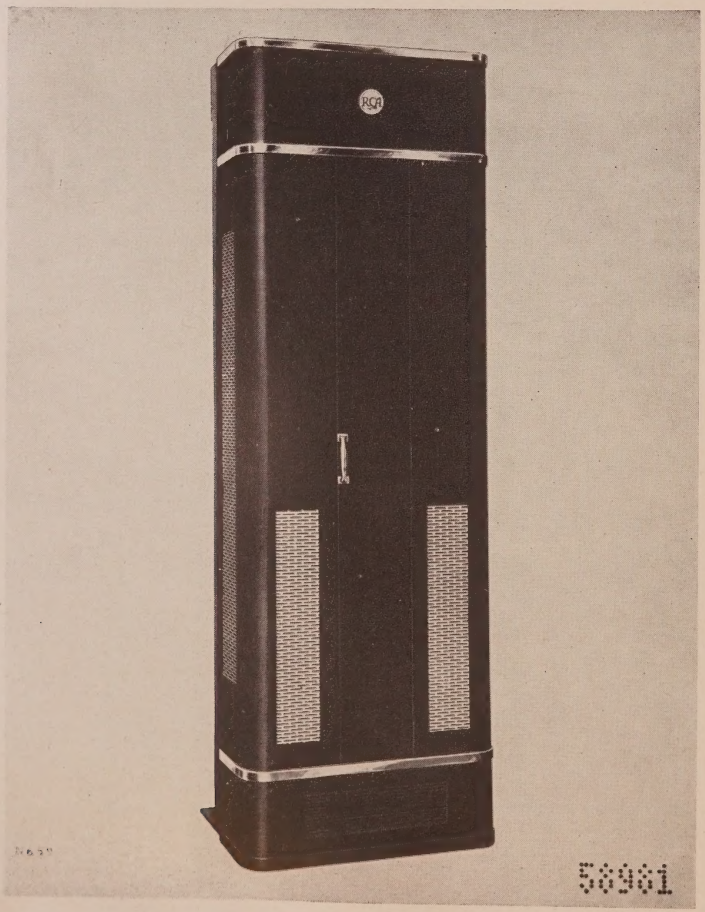
For theatres having up to 1,750 seats, the 40-watt system is recommended. The 50-watt system has enough power for a seating capacity up to 2,250. For theatres up to 3,700 seats, two amplifier units working together and giving 80 watts output are supplied. Two amplifiers, furnishing 100 watts are supplied for theatres up to 4,600 seats. For more than 4,600 seats, special extra amplification is necessary.

The chassis is fastened to a swinging shelf so that the unit can swing out and lock on its side, thus exposing all wires and connections to easy inspection and maintenance.

Component parts are safeguarded against excessive heat and humidity, thus enabling the equipment to withstand all climatic conditions.

Only a simple soldering job is neces-

RADIO CORPORATION'S AMPLIFIER RACK



sary to hook it into a public address system or a music distribution system.

A control on the amplifier panel provides for quick switching between film reproduction, microphone, and non-synchronous record turntable. Other knobs adjust the volume for monitor speaker, microphone, and turntable.

Correct voltage and current necessary for the sound system, with the exception of that received directly from the power line, are furnished by tube rectifiers.

A sound system is only as good as the backstage speakers which provide the final step in the process of sound-film reproduction. The permanent-magnet Duophonic loudspeaker combinations for the Westrex Master system are superior to any pre-war speaker combinations.

Energy radiated backwards from the low-frequency units is used to reinforce the over-all efficiency of the new Duophonic combinations. It will no longer be necessary to use drapes to eliminate backstage reverberation. With the same amount of electrical energy, Duophonics deliver twice as much acoustic energy to the auditorium compared with pre-war systems.

The new baffle designs increase realism—make the "screen presence" more life-like than ever. The illusion is almost perfect. Sounds appear to come from the screen itself and not from behind it.

Different sizes of baffles are available with different combinations of high- and low-frequency units. The ultra-high-powered speaker systems for the largest theatres may contain two high-frequency receivers on one horn or as many as six low-frequency units.

(For a more complete discussion of this equipment, see Altec-Lansing Voice of the Theatre model A-4, for medium theatres, and Voice of the Theatre model A-5, for small theatres.)

Westrex Standard

The Westrex Corporation offers a new, simplified, low-priced sound system, the Westrex Standard.

Exhibitors whose budgets are limited and who want faithfulness of Western Electric quality sound reproduction can now meet both these conditions with the Westrex Standard.

The Standard has quality and ruggedness that have never before been attained in comparable equipment. The entire system has been efficiently simplified to hold the cost at a moderate price level, and yet overall performance is superior to most pre-war, high-priced systems.

Extensive use is made of new ideas and components which have been developed by intensive wartime research in Western Electric's greatly expanded laboratories and manufacuring plants.

Noteworthy features of the Westrex Standard are the following: an improved method of reducing mechanical flutter, efficient amplification, and improved conversion of electrical energy into acoustic energy.

These are all features that the alert exhibitor will recognize as necessary to attract increased patronage.

The Standard reproducer uses the hydro flutter suppressor to reduce mechanical flutter. It is Western Electric's solution of one of the most vexing problems in sound reproduction: the irregular movement of the film as it passes the scanning beam. This is how it works: Two film-pad rollers coordinated by a spring respond sensitively to the pressure of the film as it passes over the lower roller. The lower roller arm is connected with a piston which moves in a special damping fluid. Even the most minute variations in speed will tend to add a slight amount of slack to the film as it loops around the impedance drum. The hydro flutter suppressor then acts instantly and holds the film snugly around the drum, reducing the flutter by more than one-half the minimum standard of 0.15 percent set by the Academy of Motion Picture Arts and Sciences.

A hand wheel, as a convenient aid when threading the film, is mounted on the motor shaft. A glance at the film path reveals the simplicity of threading operation. There is only one sprocket and two pad rollers in the film path. White interior walls and a threading light add to the ease of threading.

The Standard reproducer uses a shock-mounted, pre-focused exciter lamp, operating from an a.c. power source. It is designed to reduce hum to the lowest level. The lamp can be adjusted vertically and laterally to insure perfect alignment with the lens tube.

The long life, high-sensitivity, photo-electric cell has an extremely low noise level when compared with its output of useful sound energy. It is shock-mounted and completely enclosed in a partition with a separate cover. This cover protects the cell from oil which might be spilled from above through excess lubrication.

A fool-proof switch for change-over of the sound system between machines is located in a convenient place on the front of the reproducer unit. This is a distinct improvement over the old, wall-mounted type of change-over by extension rods.

The motor is ball-bearing and oversized to provide a safe margin of power. The v-belt drive is short and efficient.

One housing contains all necessary amplification. The 15-watt power amplifier is fed by a coaxial cable from the photo-electric cell. Included in the same housing is the power unit for furnishing filament and plate voltages to all tubes. These units comprise an integral assembly mounted on a single chassis.

The well-known negative feed-back circuit—a development of Western Electric and Bell Telephone Laboratories—provides a self-compensating correction for harmonic sound distortion. The distortion in this amplifier is less than 2 percent. Transformers, coils, condensers, and resistors are designed to reduce the possibility of failure. Component parts which would be affected by high temperature and humidity have been specially treated to withstand such climatic conditions.

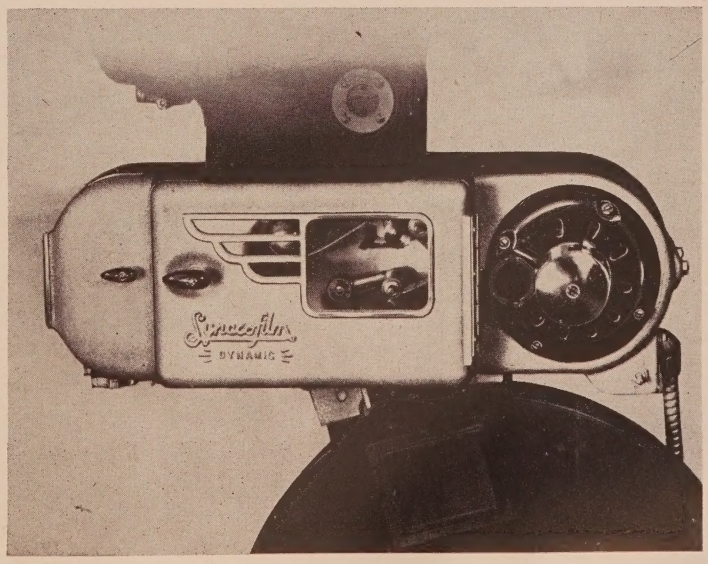
The Westrex Standard sound system can be adapted for use with any standard make of projector.

The Westrex Standard uses a duplex loudspeaker in which a miniature high-frequency, multi-cellular horn is mounted coaxailly with the low-frequency speaker. This combination gives excellent distribution of sound throughout the auditorium.

There are two speaker combinations: one for theatres having up to 600 seats, and another for houses seating up to 1,200. These new speaker combinations are twice as efficient as similar pre-war units and aid in giving a screen "presence" and auditorium coverage, which are salient features of the post-war Westrex Standard.

(For further speaker details, see the discussion of Altec-Lansing Voice of the Theatre models.)

WEBER MACHINE'S SYNCROFILM DYNAMIC REPRODUCER



Suggestions on Planning Projection Rooms

A Cursory Review of Basic Specifications For the Most Efficiently Operated Booths

The modern projection room, properly designed for the greatest operating efficiency, is divided into four separate and distinct units: (1) The projection room proper, (2) the rewind room, (3) the power-equipment room, and (4) the toilet and lavatory room.

The material here presented has been compiled from the National Theatre Supply's "Planning the Projection Room," the Radio Corporation of America's "Photophone Handbook for Projectionists," and other authoritative sources.

The blueprint drawings, presented here in fold-out pages, as well as the other illustrations, have been used through the courtesy of Walter E. Green, A. J. Lindsley, and the National Theatre Supply Division of National-Simplex-Bludworth, Inc.

PROJECTION ROOM PROPER

Location

In the design of the theatre, the location of the projection room is of prime importance in securing the finest possible screen image. Experience has shown that the projection room should be so located that the vertical projection angle approaches as nearly as possible the ideal angle of 0 degrees and never exceeds 14 degrees. Placing the projectors equidistant on each side of the theatre centerline and 5 feet apart is essential.

The projection room should not be so close to the screen that it would be necesary to use a projection lens less than 4 inches e.f., since sharp definition all over the screen area would not be possible. Nor should the projection booth be so far removed from the screen that a lens exceeding 7 inches e.f. would be required, as this lens would not be able to handle all the available light, with the result that screen illumination would be uneven.

Dimensions

The height of the projection room ceiling should never be less than 8 feet, and, in the warmer latitudes, 12 feet is a more desirable minimum. The width and depth will vary with the amount of equipment installed and by whether the film rewinding and storing is to be incorporated in a separate room or in the projection room proper.

If a separate rewind room is provided, the width of the projection room should be 8 feet for one projector plus 6 feet for each additional projector, spotlight, stereopticon or effect machine. Thus, the average projection room containing two projectors and one stereopticon will be 20 feet wide. A depth of 10 feet will be adequate.

It is sometimes impractical to provide a separate rewind room and it then becomes necessary to allow more space in the projection room proper for this purpose. If the film rewinding and storing facilities are provided for at the right or left side of the projectors, the projection room should be 16 feet wide for one projector plus 6 feet for each additional projector, spotlight, stereopticon or effect machine. The depth of the room will still remain 10 feet. It may be advantageous to provide the film rewinding and storage facilities at the rear of the projectors in which case the projection room should be calculated the same as if a separate rewind room was provided but the depth of the room should be a minimum of 12 instead of 10 feet.

Construction of projection rooms must be of approved fire resisting materials. The size of such rooms depends upon the type and number of projectors and other apparatus to be installed. When all equipment is installed there should be a minimum of 2 feet on either side and to the rear of such equipment (for working space) from either wall.

Where it is desired to rewind and inspect films in the projection room, it is well to consult local authorities on means that will be approved as to safety.

To insure access to and around professional projectors or apparatus, such machines should not be placed closer together than 4 feet with throws up to 75 feet, not closer than 4½ feet with throws up to 125 feet, and not closer than 5 feet with throws over 125 feet. These measurements are based on the optical centers of the apparatus.

Floor Construction

It is important that the floor of the projection room be constructed to provide for a minimum strength of 200 pounds to the square foot, plus the dead weight of the construction proper.

An entirely satisfactory floor consists of (1) a reinforced concrete floor slab 4 inches thick, (2) a tamped cinder fill not less than 4 inches thick, and (3) a troweled cement finish 2 inches thick. The cinder fill and cement finish are provided to accommodate the concealed conduit.

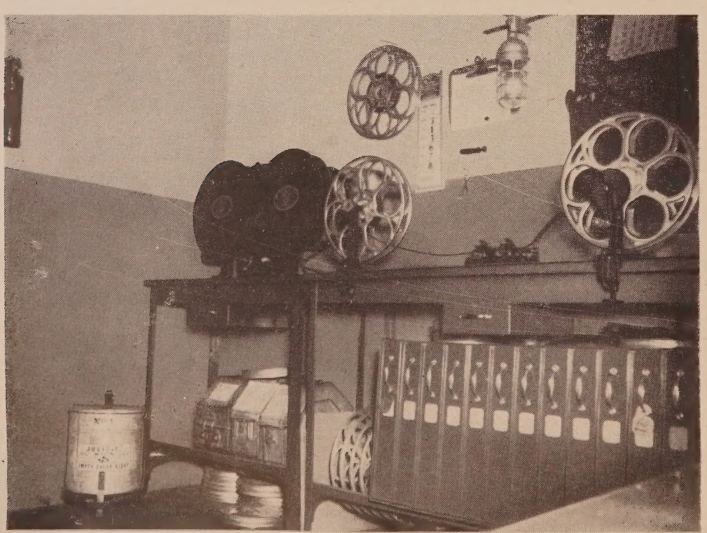
For a still better floor surface, it may be topped with a high-grade cement, linoleum or similar floor-covering material, or painted to prevent "dusting" and thus to eliminate the chance of minute cement particles getting on the film and causing scratches.

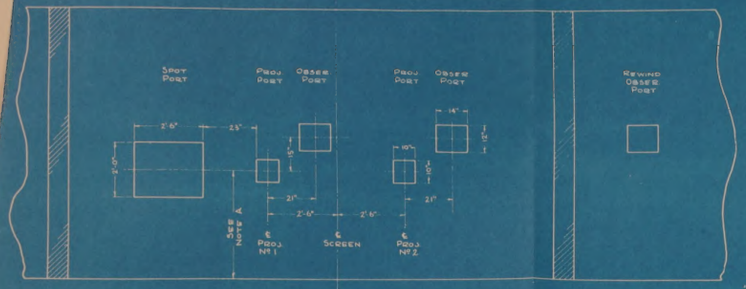
Wall Construction

Brick, tile, or plaster blocks, finished on the inside with ¾-inch of cement or acoustical plaster, form a satisfactory projection room wall.

The core of the wall should be at least 4 inches thick and all electrical conduit should be concealed in the wall. The ceiling should be constructed of 4-inch concrete slabs, or pre-cast concrete, or of 3-inch plaster blocks supported by a steel structure and be finished on the

THE REWIND ROOM

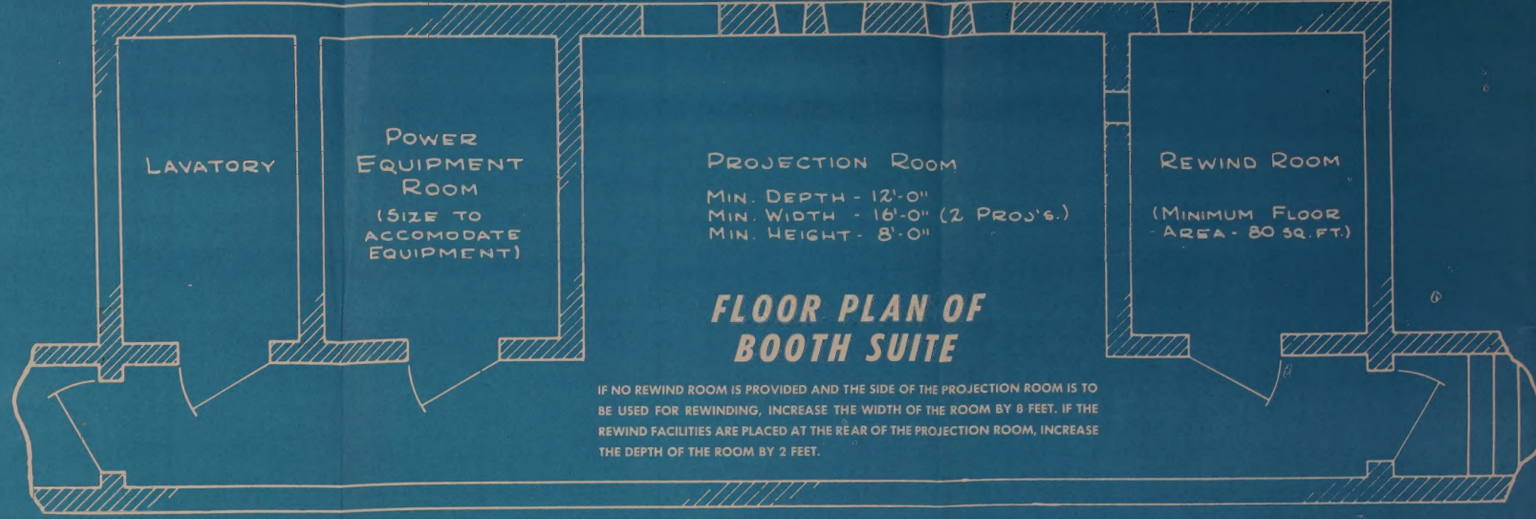




FRONT WALL PLAN

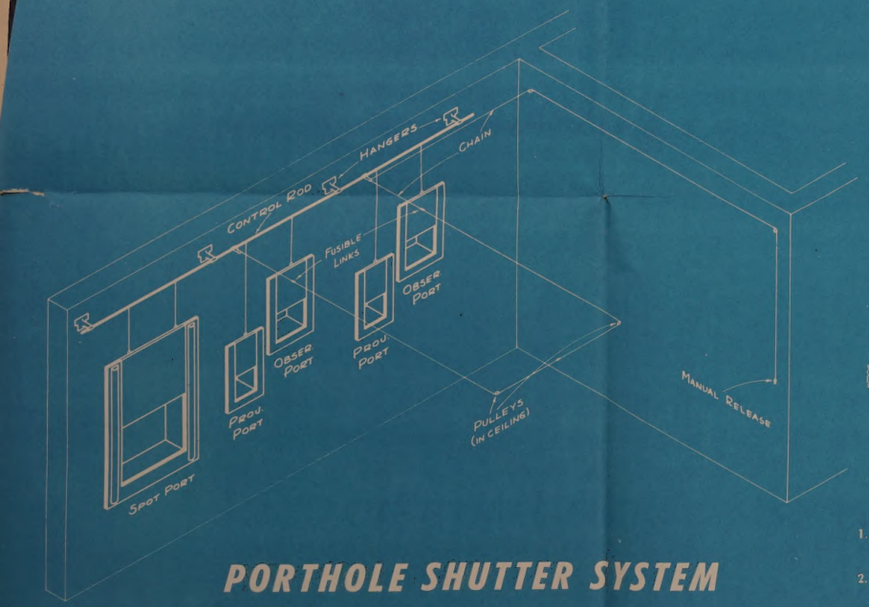
NOTES A DIMENSIONS FROM FINISHED FLOOR TO CENTER LINE OF PROJECTION AND SPOT-LIGHT PORTS VARIES WITH THE ANGLE OF PROJECTION. A CONVENIENT TABLE HAS BEEN PROVIDED ON THIS SHEET WHICH LISTS BOTH PROJECTION ANGLES AND THEIR PROPER CORRESPONDING DI MENSIONS.

B ALL OBSERVATION PORTS ARE CONSTRUCTED WITH A GREATER WIDTH THAN HEIGHT TO PERMIT A MUCH CLEARER VIEW OF THE SCREEN.

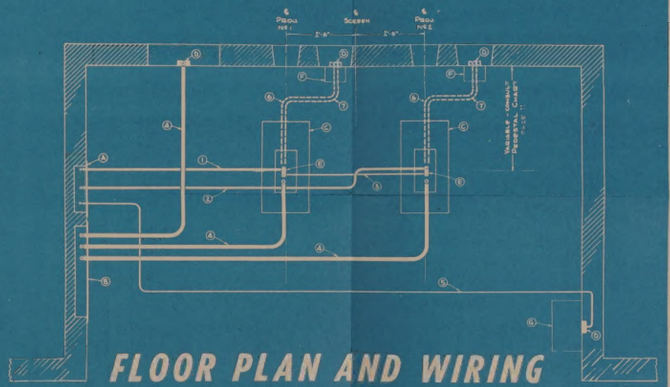


FLOOR PLAN OF BOOTH SUITE

IF NO REWIND ROOM IS PROVIDED AND THE SIDE OF THE PROJECTION ROOM IS TO BE USED FOR REWINDING, INCREASE THE WIDTH OF THE ROOM BY 8 FEET. IF THE REWIND FACILITIES ARE PLACED AT THE REAR OF THE PROJECTION ROOM, INCREASE THE DEPTH OF THE ROOM BY 2 FEET.



PORTHOLE SHUTTER SYSTEM



FLOOR PLAN AND WIRING

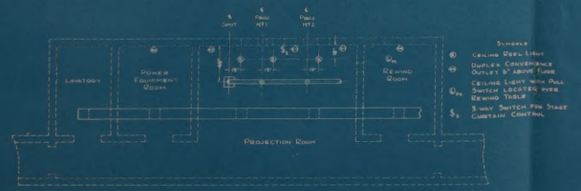
EQUIPMENT

A. 110 V. 60 CY. A.C. CIRCUIT PANEL
B. D.C. DISTRIBUTION PANEL
C. PEDESTAL
D. 4-11/16" SQUARE OUTLET BOX
E. 4" SQUARE OUTLET BOX
F. VOLUME CONTROL AMPLIFIER
G. MAIN AMPLIFIER

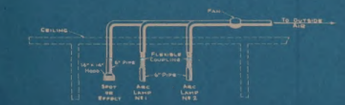
CONDUIT AND WIRING

1. ¾" CONDUIT — 2 #14 BRC MOTOR CIRCUIT, 2 #14 BRC CHANGEOVER CIRCUIT, 2 #14 BRC PILOT LAMPS AND PEDESTAL OUTLETS
2. ¾" CONDUIT — 2 #14 BRC MOTOR CIRCUIT, 2 #14 BRC PILOT LAMPS AND PEDESTAL OUTLETS
3. ½" CONDUIT — 3 or 4 #14 BRC (DEPENDING UPON TYPE INSTALLED) CHANGEOVER LOOP
4. 1-¼" CONDUIT — 2 #2 BRC TO ARC LAMPS
5. ½" CONDUIT — 2 #14 BRC TO MAIN AMPLIFIER
6. ½" CONDUIT — SOUND SYSTEM WIRING
7. ½" CONDUIT — SOUND SYSTEM WIRING

NOTE: IF 3 PHASE TUNGAR TYPE RECTIFIERS OR COPPER OXIDE RECTIFIERS ARE INSTALLED A RELAY CIRCUIT OF 2 #12 BRC MUST BE RUN DIRECT FROM EACH RECTIFIER TO EACH PEDESTAL. THIS CIRCUIT IS NOT SHOWN ABOVE.



ROOM AND PROJECTION VENTILATION



PROPER LOCATION OF THE PEDESTAL AND PROJECTION PORT ★

ANGLE OF PROJECTION	PEDESTAL: FLOOR TO CENTER OF PORT	PEDESTAL: WALL TO CENTER LINE OF PEDESTAL	SPOT LIGHT: SPOT PORT
-3	50 *	45 3/4"	48 *
-2	49 1/4"	45 3/4"	48 *
-1	48 1/2"	45 3/4"	48 *
0	48 *	45 3/4"	48 *
1	47 1/4"	45 3/4"	47 1/2"
2	46 5/8"	45 3/4"	47 *
3	45 1/8"	45 3/4"	46 1/2"
4	45 1/2"	45 3/4"	46 *
5	44 7/8"	45 3/4"	45 1/8"
6	44 1/4"	45 3/4"	44 3/4"
7	43 5/8"	45 3/4"	44 1/4"
8	43 *	45 3/4"	43 3/4"
9	42 3/8"	45 3/4"	43 1/8"
10	41 3/4"	45 3/4"	42 1/2"
11	41 1/4"	45 3/4"	42 *
12	40 5/8"	45 3/4"	41 1/2"
13	40 *	45 3/4"	41 *
14	39 3/8"	45 3/4"	40 1/2"
15	38 3/4"	45 3/4"	39 3/4"
16	38 1/8"	45 3/4"	39 *
17	37 1/2"	45 3/4"	38 3/8"
18	36 7/8"	45 3/4"	37 7/8"
19	36 1/8"	46 1/4"	37 1/8"
20	35 3/8"	46 5/8"	36 1/2"

NOTE: ANY ANGLE OF PROJECTION THAT IS OVER 20° WOULD PRESENT A DIFFICULT MOUNTING PROBLEM AND THE GREATEST CAUTION SHOULD BE EXERCISED BY REFERRING THE MATTER TO AN ARCHITECT OR PROJECTION ENGINEER. *AVERAGE DISTANCES AND SHOULD BE CHECKED AGAINST THE REQUIREMENTS OF SPECIFIC EQUIPMENT.

REFERENCE TABLES

DESIGNED TO PERMIT BOTH THE EXHIBITOR AND THE ARCHITECT TO READILY SELECT A RECOMMENDED, STANDARD SIZED SCREEN FOR ANY THEATRE HAVING A PROJECTION DISTANCE NOT EXCEEDING 160 FEET. IT IS BASED ON THE RESULTS OF A SURVEY MADE BY THE SOCIETY OF MOTION PICTURE ENGINEERS SEVERAL YEARS AGO IN WHICH IT WAS FOUND A DEFINITE RATIO EXISTS BETWEEN THE WIDTH OF THE SCREEN AND THE PROJECTION DISTANCE. THIS RATIO IS 1 to 5.2. FOR EXAMPLE, AN AVERAGE THEATRE HAVING A PROJECTION DISTANCE OF 100 FEET WILL HAVE A SCREEN APPROXIMATELY 19 FEET, 6 INCHES WIDE. IN ALL CASES THE PROJECTION DISTANCE APPROXIMATED THE LENGTH OF THE SEATING AREA—THE RATIO DID NOT EXIST WHEN THE PROJECTION ROOM WAS LOCATED AT THE FRONT OF A BALCONY OR FAR BEHIND THE SEATING AREA. THE CHART HAS BEEN PREPARED ON THIS RATIO AND A 4.25" EF LENS PROVIDES THE "RECOMMENDED" PICTURE SIZE IN EVERY CASE. HOWEVER, THE COMPUTATIONS ARE BASED ON AN AVERAGE, SO ONE LENS SIZE ON EITHER SIDE OF THE "RECOMMENDED" HAS BEEN INCLUDED AND A VERY SATISFACTORY PICTURE SIZE WILL BE OBTAINED FROM ANY ONE OF THESE THREE LENSES.

LET'S TAKE A SPECIFIC EXAMPLE AND SEE JUST HOW SCREEN SIZE IS DETERMINED BY USING THIS CHART. THE THEATRE IN WHICH YOU ARE INTERESTED WAS DESIGNED WITH A PROJECTION DISTANCE OF 120 FEET. YOU NOTE THAT THE DARK VERTICAL ROW RUNNING ACROSS THE TOP OF THE CHART DESIGNATES PROJECTION DISTANCE IN FEET. HAVING SELECTED THE 120-FOOT COLUMN, YOU FIND ON RUNNING YOUR FINGER DOWN TO THE DARK SHADED SECTION, THAT THE LENSES RECOMMENDED ARE 4.00", 4.25" AND 4.50" TO PROVIDE A PICTURE SIZE CONFORMING WITH THE AVERAGE OF ALL THEATRES. AS THE 4.25" LENS PROVIDES THE "RECOMMENDED" PICTURE SIZE YOU FOLLOW THIS ROW TO THE RIGHT TO THE COLUMN HEADED "MAXIMUM PICTURE SIZE" AND FIND THAT IT IS 17'6"x23'0". IN THE NEXT COLUMN YOU FIND THE "SCREEN SIZE," 18'x24' WHICH SHOULD BE USED FOR THIS PICTURE SIZE AND IN THE THIRD COLUMN, "MAXIMUM OVERALL SIZE";YOU LEARN THE MAXIMUM OVERALL SPACE WHICH MUST BE ALLOWED ON THE STAGE FOR THE COMBINED SCREEN FRAME IS 20'x26'.

PROJECTION DISTANCE (THROW)																						MAXIMUM PICTURE SIZE	SCREEN SIZE	MAXIMUM FRAME SIZE
50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160			
					2.00	2.25	2.50	2.50	2.75	2.75	3.00	3.25	3.25	3.50	3.50	3.75	3.75	4.00	4.00	4.25	4.50	4.50	22' X 29'6"	22'6" X 30"	24'6" X 32"
				2.00	2.25	2.50	2.50	2.75	2.75	3.00	3.00	3.25	3.50	3.50	3.75	3.75	4.00	4.00	4.25	4.50	4.50	4.75	21'6" X 28'6"	21'9" X 29"	23'9" X 31"
				2.25	2.25	2.50	2.75	2.75	3.00	3.00	3.25	3.25	3.50	3.75	3.75	4.00	4.00	4.25	4.50	4.50	4.75	4.75	19'6" X 27'6"	21" X 28"	23" X 30"
			2.00	2.25	2.50	2.50	2.75	2.75	3.00	3.25	3.25	3.50	3.50	3.75	4.00	4.00	4.25	4.50	4.50	4.75	5.00	5.00	19'6" X 26'6"	20'3" X 27"	22'3" X 29"
			2.25	2.25	2.50	2.75	2.75	3.00	3.25	3.25	3.50	3.50	3.75	4.00	4.00	4.25	4.50	4.50	4.75	5.00	5.00	5.25	19" X 25'6"	19'6" X 26"	21'6" X 28"
		2.00	2.25	2.50	2.50	2.75	3.00	3.00	3.25	3.50	3.50	3.75	4.00	4.00	4.25	4.50	4.50	4.75	5.00	5.00	5.25	5.50	18'3" X 25'6"	18'9" X 25"	20'9" X 27"
		2.25	2.25	2.50	2.75	3.00	3.00	3.25	3.50	3.50	3.75	4.00	4.00	4.25	4.50	4.50	4.75	5.00	5.00	5.25	5.50	5.75	17'6" X 23'6"	18" X 24"	20" X 26"
	2.00	2.25	2.50	2.75	2.75	3.00	3.25	3.25	3.50	3.75	4.00	4.00	4.25	4.50	4.75	4.75	5.00	5.25	5.25	5.50	5.75	6.00	16'9" X 22'6"	17'3" X 23"	19" X 24'9"
	2.25	2.25	2.50	2.75	3.00	3.25	3.25	3.50	3.75	4.00	4.00	4.25	4.50	4.75	4.75	5.00	5.25	5.50	5.50	5.75	6.00	6.25	16" X 21'6"	16'6" X 22"	18'3" X 23'6"
2.00	2.25	2.50	2.75	3.00	3.00	3.25	3.50	3.75	3.75	4.00	4.25	4.50	4.75	4.75	5.00	5.00	5.25	5.50	5.75	5.75	6.00	6.25	15'3" X 20'6"	15'9" X 21"	17'6" X 22'6"
2.25	2.50	2.50	2.75	3.00	3.25	3.50	3.75	3.75	4.00	4.25	4.50	4.75	5.00	5.00	5.25	5.50	5.75	6.00	6.25	6.25	6.50	6.75	14'6" X 19'6"	15" X 20"	16'9" X 21'9"
2.25	2.50	2.75	3.00	3.25	3.50	3.75	3.75	4.00	4.25	4.50	4.75	5.00	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	13'9" X 18'6"	14'3" X 19"	15'9" X 20'6"
2.50	2.75	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.00	7.25	7.50	13" X 17'6"	13'6" X 18"	15" X 19'6"
2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	12'6" X 16'6"	12'9" X 17"	14'3" X 18'6"
2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00		11'6" X 15'6"	12" X 16"	13'6" X 17'6"
2.75	3.25	3.50	3.75	4.00	4.25	4.50	5.00	5.25	5.50	5.75	6.00	6.25	6.50	7.00	7.25	7.50	7.75	8.00					10'6" X 14'6"	11'3" X 15"	12'9" X 16'6"
3.00	3.50	3.75	4.00	4.25	4.50	5.00	5.25	5.50	6.00	6.25	6.50	6.75	7.00	7.50	7.75	8.00							10" X 13'6"	10'6" X 14"	12" X 15'6"
3.25	3.75	4.00	4.25	4.75	5.00	5.25	5.75	6.00	6.25	6.75	7.00	7.25	7.50	8.00									9'3" X 12'6"	9'9" X 13"	11'3" X 14'6"
3.50	4.00	4.25	4.75	5.00	5.50	5.75	6.00	6.50	6.75	7.25	7.50	8.00											8'6" X 11'6"	9" X 12"	10'6" X 13'6"
4.00	4.25	4.75	5.25	5.00	5.75	6.25	6.75	7.00	7.50	8.00													7'6" X 10'6"	8'3" X 11"	9'6" X 12'6"
3.25	4.75	5.25	5.75	6.25	6.50	7.00	7.50	7.75															7" X 9'6"	7'6" X 10"	9" X 11'6"

SCREEN CHART

PLANS AND TABLES FOR AN IDEAL PROJECTION ROOM

inside with ¾-inch cement or acoustical plaster.

Doors

At each end of the projection room, a door not less than 2 feet 6 inches wide and 6 feet 8 inches high of the approved fire-door type, self-closing, and swinging outwardly, will provide the necessary means of egress and ingress and at the same time satisfactorily protect the balance of the theatre.

Should either projection-room door lead into the auditorium, it should be a double one, with at least a 2-foot air lock between, for added safety.

Windows

It is desirable to provide one or more windows in the rear wall of the projection room, if this wall is an exterior wall of the theatre. The window frome must be of steel construction and the glass of the shatter-proof type.

Portholes

All porthole openings must be covered by gravity type shutters sliding in metal frames and constructed of not less than No. 10-gauge iron.

The drop shutter should overlap the openings at least 1 inch all around and should be connected to a system that will operate automatically in case of fire or other emergency. Fusible links above each shutter and over each piece of equipment asures immediate system reaction to fire. Large porthole shutters should be counterweighted to facilitate manual operation.

Projection ports should be about 10 x 10 inches, masked after the machines are set and properly aligned on the screen to an area just a bit larger than that which is required to pass the whole projected light beam. Observation ports should be large enough to give the projectionist a clear view of the screen. As a result, for easy viewing, these ports are wider than they are high, with 14 x 12 inches affording a fair average. When included in the design, the spot port should be 2½ x 2 feet. The distance of the centers of the ports from the projection room floor varies according to the angle of projection.

Wiring

The efficient operation of all projection room equipment depends largely upon the electrical wiring to and in the projection room. This is especially true in regard to power wiring both of the primary and secondary (a.c. and d.c.) requirements.

The a.c. power wiring to the projection room location is generally for 3-phase, 208-250-volt, 60-cycle a.c. current which supplies the motive power for direct-current generators which, in turn supplies the d.c. power to the arc-lighting equipment, or furnishes the primary excitation for the transformers of arc supply rectifiers.

The a.c. power supply line should be of ample size and conductivity to furnish all primary load requirements with at least a 25 percent over-load factor. If conductors are just large enough, or undersized, the resultant IR drop in the line may seriously affect the operation of the motor-generator or rectifiers. This in turn will affect the automatic feed controls of the arc lamps, poor screen illumination will result and the generator, or rectifier, may overheat to such a point as to become inoperative or be permanently injured.

The installation of any projection room equipment, the power requirement of which is in excess of the power required on equipment which has been in operation, should not be assumed until a competant electrician has checked the power lines to determine if the new equipment will operate efficiently with existing wiring. If a re-wiring job is indicated, this should be done before the new equipment is installed, as it will provide greater economy and more efficient operation of the new installation by operating the component parts of the manufacturer's specified ratings.

A constant voltage is one of the foremost requirements of modern projection room equipment. For instance, in the past few years, new and improved carbons have been developed using a low arc voltage and giving greater economy to the arc-ampere. Due to this low voltage requirement, the potential must be maintained accurately or impaired operation will result. The carbons will not burn properly when the arc supply voltage fluctuates. This condition upsets the automatic arc control device causing poor feeding of carbons and unsteady screen illumination which, of course, is undesirable.

The foregoing is proof that it is highly necessary to have the proper wiring in the projection room for optimum equipment efficiency.

Ordinary rubber-covered cord or wire should not be used where it will be subjected to lubricating oil. Oil will, after a time, dissolve the rubber covering, causing a direct short circuit of such conductors. For such applications, a special hard-braid or varnish-coated insulated cord should be used.

All switches, switch cabinets, ballast rheostats, bus panels, and the like should be inspected regularly to make sure that the contact and current-carrying parts are clean and that all connections are tight. If this is not done, normal vibrations may loosen a terminal unit, creating a high resistant contact which, in some cases, will burn completely away and stop the show before it is discovered.

Many cases of complaint as to the operation of arc lamps can be traced to a loose connection hidden away somewhere behind a switch or terminal panel. The trouble can be avoided by a regular system of inspection by the projectionist in charge of projection room maintenance.

Only the professional-type of projector shall be used in the theatre.

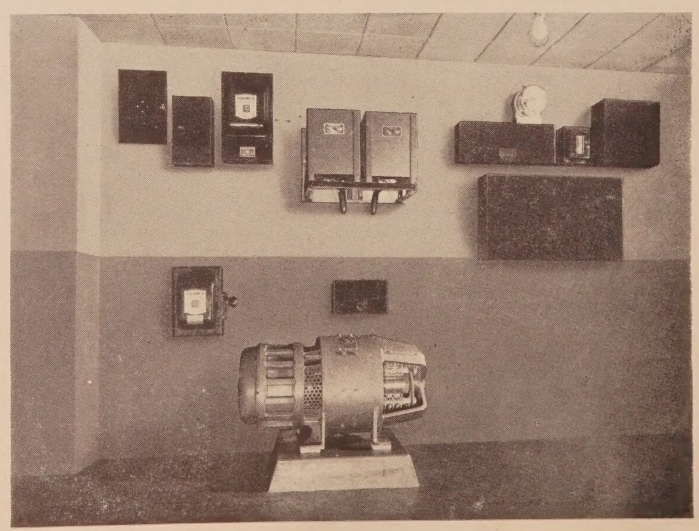
The definition of such projector is one that carries the approval of the National Board of Fire Underwriters and which uses 35-mm. film (which is 1⅜ inches wide) with uniform perforations on each edge measuring 5.4 perforations to the inch.

Drive motors for professional type projectors shall be approved as to design and application. Such motors must be enclosed or otherwise guarded against any possibility of sparks or arc from brushes or contactors coming in contact with film while threading projectors, rewinding film, or during any necessary handling of film in the projection room.

Conductors supplying outlets for professional-type projectors shall not be smaller than No. 8 A. W. G. standard. Any special application requiring larger conductors must be calculated with the full-load current as well as reasonable safety factor in carrying capacity above full-load requirements. Such factor is generally figured to be 25 percent. Asbestos-covered conductors shall be used on arc lamp or other equipment where the ambient temperature at the conductor as installed will exceed 120 degrees Fahrenheit.

Any flexible cords used for portable equipment in the projection room shall be of the hard service type, such as K, S, or SJ.

THE POWER ROOM



Lighting

Generous consideration should be given to the problem of lighting the projection room.

Indirect or semi-direct ceiling fixtures should be provided at the operating side of each piece of equipment. All lights should be shaded to prevent light from entering the auditorium through the portholes.

It is advantageous to provide convenience outlets along the base of the wall for the use of the projectionist.

All portable work lamps shall be provided with approved lamp guards. All projection room fixed lights shall be provided with approved lamp guards or be protected by noncombustible shades or other inclosures.

Ventilation

Two separate ventilation systems are necessary in the projection room: one for the ventilation of the room proper, the other for the carbon-arc equipment.

Projection room ventilation must be provided by means of a vent pipe or pipes, which are installed to vent to the outside atmosphere.

Each piece of equipment of the carbon-arc type should be connected to a common duct which runs directly to the outside air. This duct must, where outside venting is not possible, vent into a noncombustible flue of special design. An exhaust fan connected to this system should provide a movement of not less than 15 cubic feet of air through each arc lamp every minute.

Vent pipes must be run so that they will always be at least 2 inches from any combustible material, or non-combustible, heat-insulating material, 1 inch thick, must be applied in an approved manner to such vent pipes as a safety measure.

The general projection room ventilating system consists of at least two fresh-air intakes, one at each end of the room, along the floor line. The exhaust system must be entirely independent of any other system in the theatre. Exhaust draft must be maintained in the projection room by a fan having a capacity of at least 200 cubic feet a minute for every 80 square feet of floor space in the projection room. This system terminated in at least two ceiling grilles, and is operated by a blower of the proper size.

Decorating

The appearance of the projection room may be greatly enhanced by painting the walls olive green from the floor to the point where the acoustical material starts. The acoustical material should be painted a dull buff color and the ceiling white. In many localities it is permissible to cover the floor with a good grade of battleship linoleum cemented in place.

Inter-Communication

Two-way telephone communication between the manager's office and the projection room is a definite necessity in modern theatre operation. Provisions should be made to locate the projection room telephone at a point on the front wall to permit the projectionist to continue observing the screen while using the communication system. In many instances, it may be desirable to have additional stations located at such points as the rear of the auditorium or on the stage.

REWIND ROOM

Rewinding of films should be done in a separate enclosure, known as the rewind room, adjacent to the projection room proper. This rewind room should be a miniature of the projection room with respect to construction.

Because of the flammable nature of film—and the ever-present fire hazard which proper construction seeks to reduce to the minimum—it is well to digress for a moment and consider very briefly the handling of film in rewind rooms. Film, while being rewound, should be enclosed in an approved rewinder, consisting of enclosures similar to the projector magazines. No film shall be exposed during rewinding. Not more than 5 feet of film shall be exposed during examination. Film for the current show, when not being projected or rewound, shall be kept in a fire-resistant, approved film storage cabinet, such cabinet to have an individual storage compartment for each reel. This cabinet should be so constructed that its compartments will be self-closing when a reel is placed in the compartment. All films in the projection room must be kept in such cabinet at all times when not in actual use. Film stored in exchange containers is not permitted in the projection room during show but must be protected by an approved cabinet or compartment. Attraction trailers, leaders, and other film stock not being used must receive the same consideration.

Rewind rooms must provide no less than 80 square feet of floor space for film rewinding and storage facilities.

One observation porthole should be provided in such a position that the projectionist may view the screen while in the rewind room. An additional porthole should be provided in the wall separating the rewind room from the projection room proper, and should consist of a fixed steel frame and polished plate wire glass window having an area of not more than 200 square inches. The horizontal centerline of this latter porthole should be located 5 feet above the floor line.

The rewind room may be connected to the same fresh-air and exhaust system that supplies the projection room.

Painting and general lighting conform with those of the propection room proper.

Recommended auxiliary lighting consists of either a reel light or a fixed wall bracket over the rewind table.

POWER EQUIPMENT ROOM

The construction of the power equipment room conforms with that of the projection room proper. The size of the room must be governed by the quantity and kind of equipment installed. It is advisable to allow space for possible future needs.

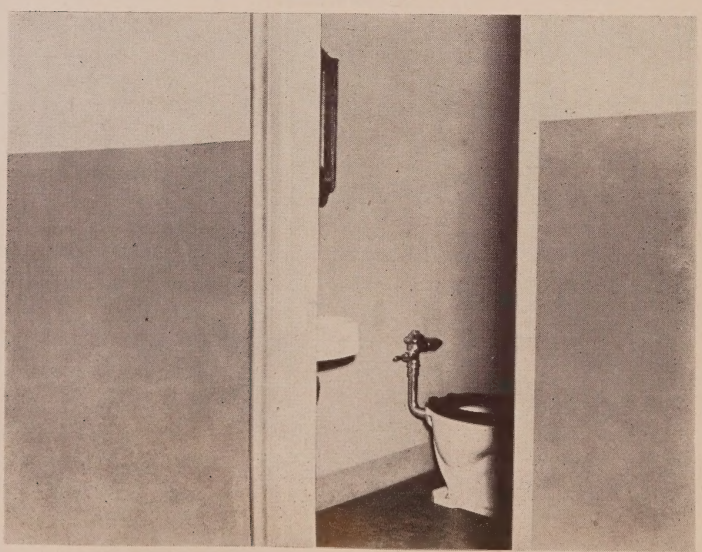
The power equipment room should be well lighted and convenience outlets provided along the base of the wall. It should be ventilated by the general projection room ventilation system and painted to match the other rooms.

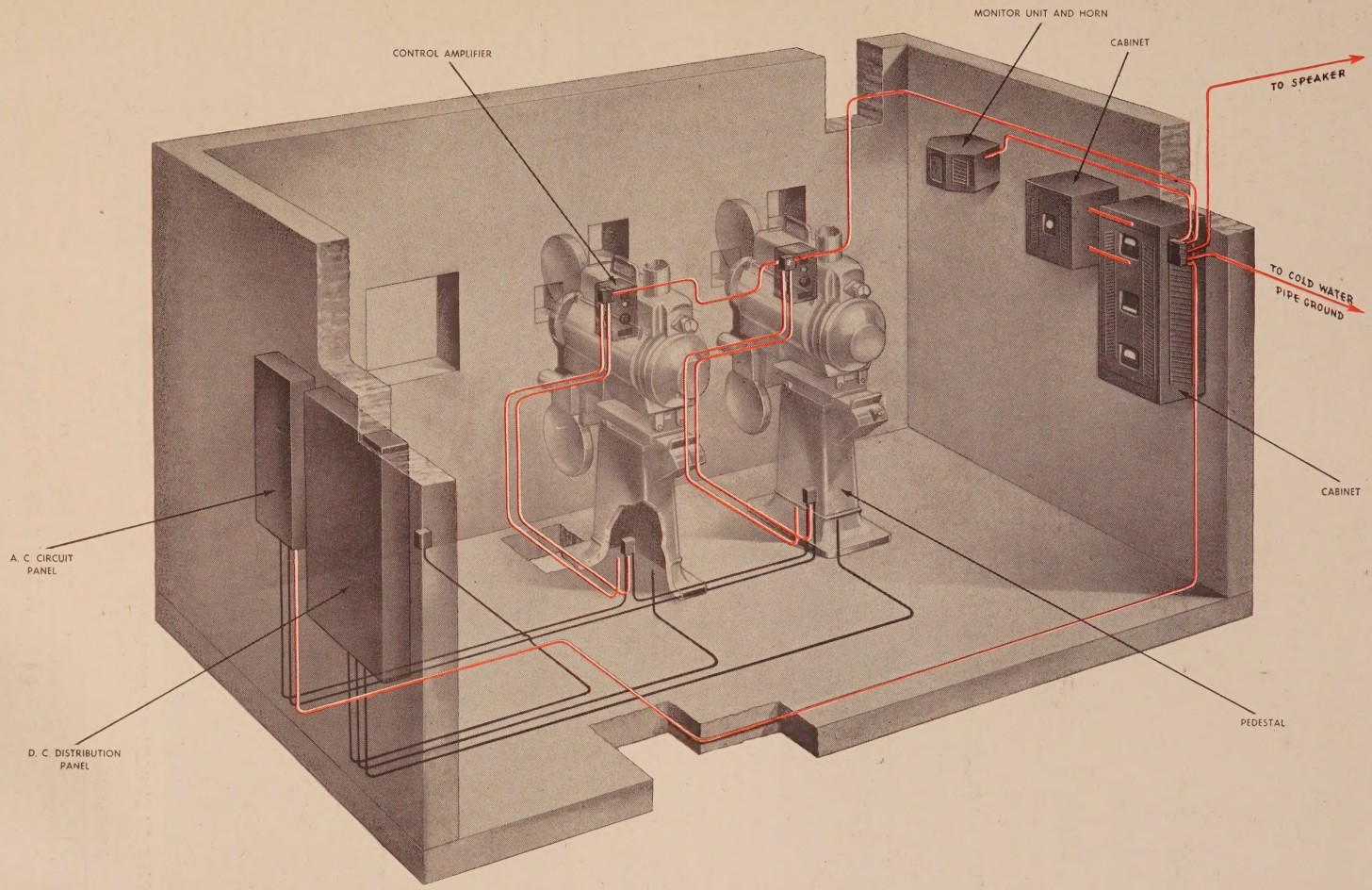
Motor-generators, transformers, rectifiers, rheostats and similar equipment should be located in a separate room; however, under conditions where such installation is not practical, it is well to consult local authorities concerning other approved means of making a safe installation.

TOILET AND LAVATORY

A clean, neat, and well-equipped lavatory is a definite asset to the efficient operation of the projection room. Modern sanitary facilities, a good wash basin with running water, and a flush-type medicine cabinet in a tiled floor room not only aid the appearance of the projection room, but reflect the generous consideration given to the convenience of the projectionist.

THE LAVATORY



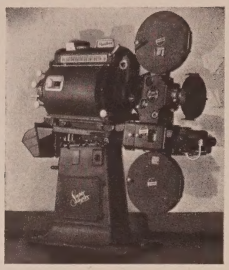


PHANTOM VIEW OF THE IDEAL PROJECTION ROOM, SHOWING THE PROJECTION (BLACK LINES) AND SOUND-EQUIPMENT WIRING SYSTEMS (RED LINES)

Simplex E-7

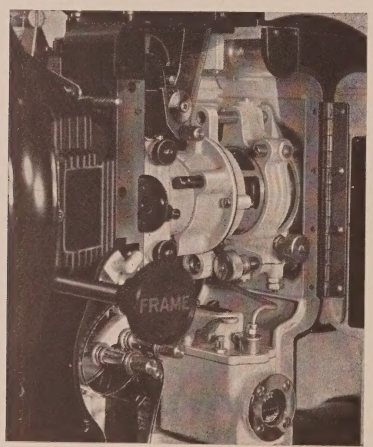
REG. U. S. PAT. OFF.

THE WORLD'S FINEST PROJECTOR



Built for Tomorrow . . . Today!

THE SIMPLEX E-7 PROJECTOR MECHANISM gives a steadier image, a cleaner picture, one that is more brilliantly lighted, far greater period of peak performance, improved operating characteristics, greater operating convenience, and indirect but important benefits to sound and light. Simplex E-7 mechanism rids the projectionist of many small detail duties, and leaves him freer than he has ever been to secure perfect screen presentation. Simplex E-7 will prove a profitable investment from the standpoint of better entertainment, pleased patrons, increased boxoffice receipts, greater dependability, and reduction of maintenance costs — Simplex E-7, the World's Finest Projector.



INTERIOR OF SIMPLEX E-7 MECHANISM

SOME OF THE SPECIAL ADVANTAGES OF THE Simplex E-7 MECHANISM

SYNCHRONIZED FRONT AND REAR SHUTTERS—Shutters are on the same shaft and each shutter acts upon one-half of the beam, creating a dissolving effect and giving 12½% more light. **More light, sharper picture, LESS EYE STRAIN.**

AUTOMATIC FIRE SHUTTER SAFETY TRIP—Releases fire shutter when film remains stationary. Cuts off light and heat. **Absolute Fire Safety.**

ONE-SHOT OILING SYSTEM—By a slight pressure on the oil pump lever, filtered oil is supplied in sufficient quantity at all times. **Cleaner Picture, Better Show, Longer Life, Less Maintenance.**

E-75 AIR DEFLECTOR AND APERTURE COOLING UNIT—Improves Light. Reduces Heat at the Aperture. Keeps Mechanism Cleaner. Prevents drawing of gasses from the arc lamp into the projection room.

REMOVABLE FILM GATE—Readily Demountable for Cleaning and Adjustment.

FILM GATE STUDS—Gate wobble eliminated. **Help Steady the Image. Proof Against Wear.**

CONE-SHAPED PAD SPRINGS—Pad keeps both edges of film under equal tension. **Reduces Sprocket Wear.**

TENSION PAD AND INTERMITTENT SHOE COMBINATION—Holds Film Securely for Steady Image.

DEMOUNTABLE FILM TRAP—Particles of emulsion can be easily cleaned away between reels. **Avoids Scratching Film.**

STUDIO TYPE GUIDES—Side motion of film controlled by replaceable guides acting in conjunction with guide rollers. **Prevent Side Sway of Film.**

THREADING FACILITIES—Quicker, more accurate threading. **Gives Projectionist More Time to Watch His Screen and Attend to Maintenance.**

FRAMING LAMP—Directly behind aperture. **Reduces Mis-framing.**

ILLUMINATED, WHITE INTERIOR—Dirt can be easily seen and promptly removed. **Promotes Cleanliness.**

SIGHT BOX—Easily removable, New fin construction. **Dissipates Heat.**

REAR SHUTTER COOLING FINS—Draw the air backward from aperture and pass it around outside the mechanism. **Insure Much Cooler Film Path.**

REAR SHUTTER GUARD—Can be quickly removed without disturbing lamphouse. **Simplifies Cleaning.**

RING TYPE GOVERNOR FOR FIRE SHUTTER—Unique type of control operates on principle of a gyroscope. **Bind-Proof, Silent.**

OVERSIZE DRIVE GEARS—Revolve on fixed studs. Place pressure of operation where it causes least wear. Rebushing of main frame eliminated. **Longer Life, Easier Maintenance.**

SYNCHRONIZING DEVICE—Prevents backlash and travel ghost caused by wear in shutter assemblies. **Gives Sharper Picture.**

DOUBLE BEARING ARM AND COVER—Warp-Proof Under Any Lamp.

INTERMITTENT MOVEMENT—Readily removable. Unnecessary to take down or disturb any part of the soundhead. **Facilitates Maintenance.**

INTERMITTENT MOVEMENT OIL SYSTEM—Reservoir can be filled from either side. Excess oil overflows on drive side. **Prevents Blurred Pictures, Noisy Sound.**

SHOCK PROOF GEAR—Eliminates vibration caused by the action of the intermittent movement. **Results in Quieter, Smoother Operation.**

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NATIONAL THEATRE SUPPLY
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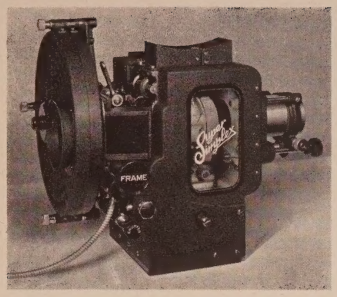
A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

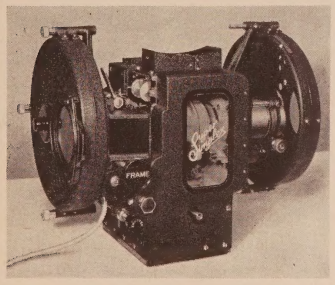


SUPER
SIMPLEX
MECHANISM

Super Simplex PROJECTOR

REG U.S. PAT OFF

SUPER SIMPLEX has proved itself in thousands of large and small theatres in the United States and throughout the world because it is sturdy and steady, dependable, efficient and economical. It has all the basic mechanical excellence due to design and construction which has given Simplex equipment a world wide leadership for many years, plus many special patented features. Super Simplex Projector is an assurance of priceless Simplex dependability, superior projection, ease of operation and low maintenance cost. Theatre owners desiring to give their patrons better projection will be glad to know that the synchronized front and rear shutters which are an integral part of E-7 Simplex Projector, can be supplied as an attachment for the Super Simplex Mechanism.



SUPER SIMPLEX
MECHANISM
with FRONT SHUTTER
ATTACHMENT

SOME OF THE SPECIAL ADVANTAGES OF THE Super Simplex MECHANISM

SUPER SIMPLEX REAR SHUTTER—Built as an integral part of the Super Simplex Mechanism. Reduces the heat at the aperture from 50% to 75% as compared with the old type Front Shutter.

ADJUSTABLE REVOLVING SHUTTER—Permits adjustment to compensate for wear in the gear train.

PATENTED FILM TRAP LOCKING DEVICE—Prevents film trap door being opened by film patches.

MAIN FRAME CASTING—Improved design and sturdier construction.

INTERMITTENT MOVEMENT—Patented star and cam adjusting feature.

LATERAL FILM GUIDE ROLLERS—Of large diameter. Revolve very easily. Eliminate possibility of cutting film by roller remaining stationary.

LENS HOLDER—Has front and rear lens supports and is rigidly attached to the main frame.

REMOVABLE FILM TRAP DOOR AND PRESSURE PAD ASSEMBLY—Very convenient for cleaning and repairing—eliminates "chatter."

HARDENED AND GROUND VERTICAL SHAFT—More than doubles wearing quality. Greatly reduces possibility of bindups.

HARDENED AND GROUND SYNCHRONIZING GEAR SHAFT—Reduces wear and increases smoothness of operation.

BAKELITE MICARTA GEARS—Give longer wear and quieter operation.

MAIN DRIVE GEAR FASTENING SCREW LOCKING DEVICE—Prevents loosening of main drive attaching screw.

MICROMETER FOCUSING DEVICE ON LENS MOUNT—Prevents backlash and maintains perfect focus.

MAIN DRIVE SHAFT—Hardened and ground, and tubular construction, provides reservoir for oil, insuring adequate lubrication at all times.

SLIP-IN TYPE APERTURE PLATE—For standard and special effects.

STAR WHEEL—This and other parts are hardened and then ground, which gives longer wear and permits finer tolerances than machining soft product and then hardening.

CAM AND CAM PIN—Quality of material, hardness, workmanship and exact tolerances make this far superior to any similar product. Insures quietness and smoothness of operation.

INTERMITTENT SPROCKET—Rims and Radii of teeth hardened, and ground to almost zero tolerance by specially designed precision machinery.

DYNAMICALLY BALANCED FLYWHEEL—Reduces vibration.

INTERMEDIATE GEAR SHAFT—Super Simplex hardened and ground intermediate gear shaft gives twice the wear of soft shafts.

SPECIALLY DESIGNED REAR SHUTTER BRACKET—Very sturdy and greatly reduces the possibility of vibration—an integral part of mechanism, not an attachment.

SYNCHRONIZED FRONT AND REAR SHUTTERS—Shutters are on the same shaft, and each shutter acts upon one-half the beam, creating a dissolving effect and considerably increasing illumination. **Better Light, Sharper Picture, Less Eye Strain.**

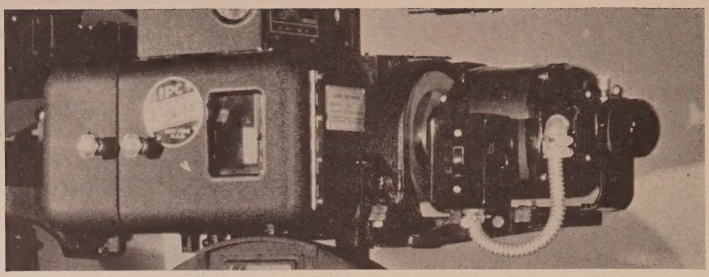
SUPER SIMPLEX PEDESTAL—Designed for modern heavy duty equipment, but so flexible little effort is required to raise or lower, or horizontally adjust the entire apparatus. Can be accommodated almost instantaneously to the screen position. Stand easily leveled at all four corners. Excellent rigidity secured by means of leveling bolts.

Manufactured by INTERNATIONAL PROJECTOR CORPORATION, 92 GOLD STREET, NEW YORK CITY

Distributed by

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.



Simplex ★★★★ Sound SYSTEMS

THE HIGH STANDARDS we have created and maintained during the past 30 years enable users of Simplex ★★★★ Sound to give their patrons the finest possible entertainment at a moderate cost.

Simplex ★★★★ Sound in design and construction meets all the requirements of theatre owners for thoroughly modern equipment. It is so flexible it can readily accommodate dual track stereophonic recordings, push-pull and any of the proposed forms of the controlled track or other changes when approved by the motion picture industry. The quality of all Simplex Systems is the same, and patrons of small theatres as well as large, can derive all the enjoyment which is the result of true sound reproduction.

The SPECIFICATIONS shown herewith will permit theatre owners to meet their budgets and theatre requirements by installing the correct number of amplifiers to provide the proper output and equip with the number and types of loudspeakers to supply capacity and distribution.

SPECIFICATIONS

Simplex ★★★★ SOUND SYSTEMS

TYPE E

Simplex Four-Star Rotary Stabilizer Sound Heads
10 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
2-Way Permanent Magnet Speaker System with:
- One (1) High and
- One (1) Low Frequency Speaker Unit
- One (1) 1 x 3 Exponential High Frequency Horn
- One (1) Low Frequency Folded exponential Horn

TYPE A-15

Simplex Four-Star Rotary Stabilizer Sound Heads
D.C. Excitation
15 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
2-Way Permanent Magnet Speaker System with:
- One (1) High and one (1) Low Frequency Speaker Unit
- One (1) Multi-cellular exponential High Frequency Horn
- One (1) Folded exponential Low Frequency Horn

TYPE A-30

Simplex Four-Star Rotary Stabilizer Sound Heads
D. C. Excitation
30 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
2-Way Permanent Magnet Speaker System with:
- One (1) High and one (1) Low Frequency Speaker Unit
- One (1) Multi-cellular exponential High Frequency Horn
- One (1) Folded exponential Low Frequency Horn

TYPE B-30

Simplex Four-Star Rotary Stabilizer Sound Heads
D.C. Excitation
30 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
2-Way Permanent Magnet Speaker System with:
- Two (2) High Frequency and two (2) Low Frequency Permanent Magnet Speakers
- One (1) Multi-cellular exponential High Frequency Horn with double throat
- Two (2) Folded exponential Low Frequency Horns

TYPE B-60

Simplex Four-Star Rotary Stabilizer Sound Heads
D. C. Excitation
60 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
2-Way Permanent Magnet Speaker System with:
- Two (2) High Frequency and two (2) Low Frequency Permanent Magnet Speakers
- One (1) Multi-cellular exponential High Frequency Horn with double throat
- Two (2) Folded exponential Low Frequency Horns

TYPE C-60

Simplex Four-Star Rotary Stabilizer Sound Heads
D. C. Excitation
60 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
- Two (2) High Frequency and four (4) Low Frequency Energized Speakers
- One (1) Multi-cellular exponential High Frequency Horn with double throat
- Two (2) Folded exponential Low Frequency Horns

Distributed by

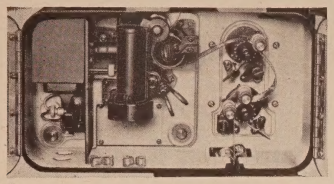
NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

FEATURES

Simplex ★★★★ SOUND SYSTEMS

SOUND HEAD MECHANISM



FILM MOTION past the scanning light beam is controlled by the well-known Rotary Stabilizer Principle.

PREFOCUSED EXCITER LAMP of new design for 9 volts, 4 amperes. Has a short sturdily supported filament minimizing vibration. Manufacturing tolerance on exciter lamp filament height is plus or minus .0012 inches. The exciter lamp bracket is easily removable and designed to permit vertical and lateral adjustments for exact positioning of filament. The exciter lamp compartment is well ventilated and careful shielding prevents any stray light from entering film compartment.

HIGHLY EFFICIENT OIL PROOF OPTICAL SYSTEM designed for protection against soiling.

PHOTO-ELECTRIC CELL vertical mounting eliminates microphonic noise. Completely out of way when threading film. Easily accessible for cleaning or replacement, less susceptible to static disturbances from film, gears, or take-up belt and well shielded against stray light. Impossible for oil to reach and saturate connecting wires and socket which are well protected and shielded in photo-cell arm casting.

LATERAL FILM GUIDE AND PRESSURE ROLLER equipped with trigger control for easy operation.

DRIVE MOTOR, cradle suspended, over-size, one-quarter horsepower split-phase induction motor with ball bearing mounted rotor, insures constant speed with variation of less than 0.5% with voltages from 105 to 125 volts. Flywheel of proper design insures correct starting speed.

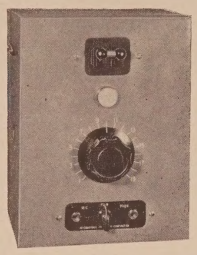
FILM DRIVE SPROCKETS, sound and holdback, included. All shafts of drive mechanism rotate on dust-proof ball bearings.

DRIVE MECHANISM ONE ASSEMBLY easily removable as a single unit by removing four screws.

SIGHT OIL GAUGE gives immediate and positive visual indication of oil level in reservoir. Insures proper lubrication of sound mechanism if oil level is maintained.

SOUND-HEAD design insures accurate alignment of projector drive gears and easy installation or removal of projector mechanism.

VOLUME CONTROL AMPLIFIER



CABINET is neat and compact. Permits mounting on front wall of projection room to avoid vibration. May be partially recessed in wall for concealment of wiring.

VOLUME CONTROL for system is a special design, de-tented step-by-step potentiometer having 19-2db. steps.

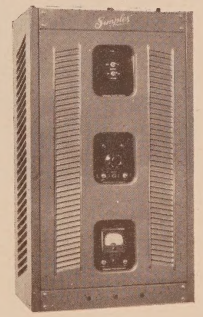
TWO-STAGE RESISTANCE COUPLED VOLTAGE AMPLIFIER employing 6J7 tubes has a 46db. gain. Normal operation at 26db. Metal type 6J7 selected for inherent shielding, uniformity and freedom of microphonic tendencies.

ELECTRONIC SOUND CHANGE-OVER comprises a three-way switching arrangement, one at each projector station, to control bias of second stage of volume control amplifier. This method of change-over control is instantaneous and noiseless since it avoids the necessity of breaking the signal circuit. Switching may be made at either projector. The exciter lamp circuit is simultaneously transferred in the change-over operation.

DUAL AMPLIFIER UNITS with single shaft, operating both volume controls in unison, can be accommodated. This provides for emergency operation or dual track reproduction.

CO-AXIAL CABLE of special low capacity couples photo-electric cell output to volume control amplifier. Low capacity shielded cable connects volume control amplifier to power amplifier.

MAIN AMPLIFIER EQUIPMENT



POWER TRANSFORMER mounted on each amplifier chassis is oversize to render continuous service on 50 or 60 cycles and tapped to compensate for various line voltages of 105, 115, and 125 volts.

AMPLIFIER FREQUENCY CHARACTERISTICS. Warping adjustments permit variations in the low frequency and high frequency response characteristics, to match various loudspeaker characteristics and equalize for theatre acoustic conditions.

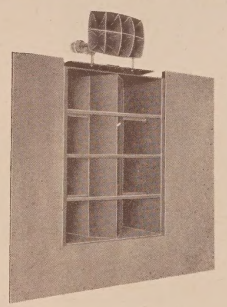
PHOTO-ELECTRIC CELL BALANCER equalizes the signal input to the power amplifier.

LOUDSPEAKER NETWORK with 400 cycle cross-over couples amplifier output to the two-way loudspeaker system. Special design features, careful selection of capacitors, resistors, and other parts afford stability of operation under all conditions.

LOUDSPEAKER NETWORK CONTROL PANEL incorporates switches for speaker testing and emergency operation on low frequency speakers only.

AMPLIFIER SWITCHING FACILITIES are provided which permit isolation of an inoperative amplifier from the signal circuit without disconnecting from power supply.

LOUDSPEAKER EQUIPMENT



COMPACT, STURDY CONSTRUCTION throughout minimizes space, simplifies installation, and reduces maintenance cost. All parts on special mountings easily removable to facilitate servicing.

HIGH FREQUENCY LOUDSPEAKER. Genuine multi-cellular exponential horn.

LOW FREQUENCY LOUDSPEAKER. Folded exponential horns of wood construction throughout. Driving units of high power handling capacity and efficiency.

MONITOR LOUDSPEAKER. Design is a definite step toward extension of the frequency response over that generally found in monitor speakers.

MONITOR AMPLIFIER provides adequate power to drive the monitor loudspeaker.

EXCITER LAMP OPERATION ON ALTERNATING CURRENT is possible in the event of failure in the rectifier system regularly supplying direct current.

Manufactured by INTERNATIONAL PROJECTOR CORPORATION, 92 GOLD STREET, NEW YORK CITY

Distributed by

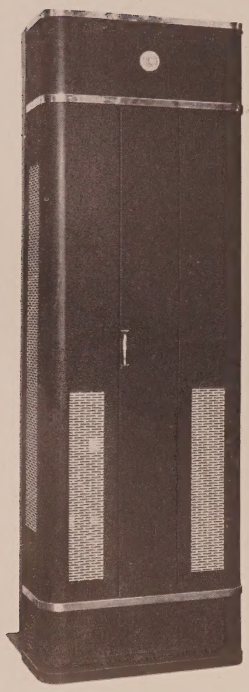
NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

RCA THEATRE EQUIPMENT

Everything for the Theatre!

RCA SOUND EQUIPMENT
FOR EVERY SIZE AND TYPE OF THEATRE



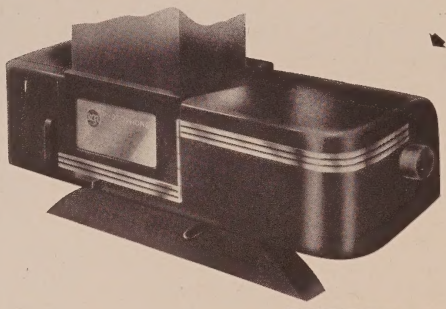
Over 8000 progressive theatre owners in all parts of the world have turned to RCA for their theatre equipment. For RCA's continual forward-looking research and vast engineering facilities have resulted in an outstanding line of equipment, with an unusual record of performance. Be sure you see RCA before you buy any theatre sound equipment.

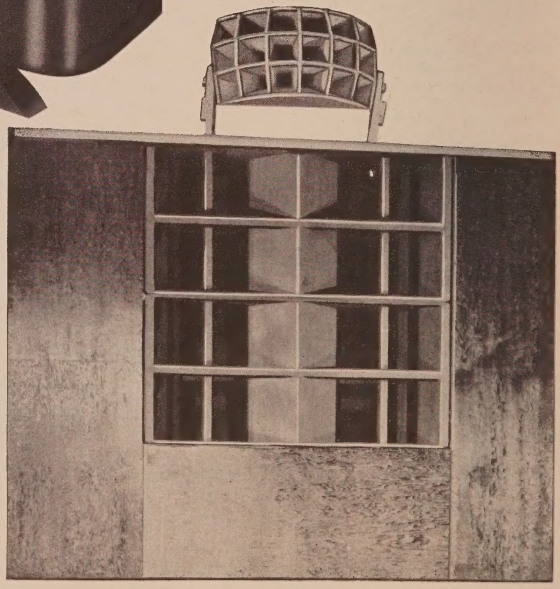
RCA AMPLIFIER AND POWER SUPPLY RACKS

RCA's vast experience in the building of top quality amplifiers and power supplies for recording studios and broadcast stations gives it a tremendous advantage in designing theatre amplifiers. Here, for instance, is the famous PG-241 rack with slip on cover in place. This reliable, carefully engineered amplifier is guaranteed to deliver not less than 25 watts undistorted output over a frequency range of 50 to 5,000 cycles under Academy method of rating. Other amplifiers for every size theatre.

RCA DE LUXE ROTARY STABILIZER SOUNDHEAD

Here is the outstanding soundhead in the industry —extra safe, extra efficient, easy to install, easy to operate, and easy to keep clean and bright. RCA's famous Rotary Stabilizer with hermetically sealed case passes film smoothly and steadily past the light beam. Easy to thread. No stationary surfaces to scratch film. In addition, the exclusive RCA "Shock Proof" drive system isolates jerky loads of the intermittent movement and film take up. The result—smoother film motion, less "flutter" distortion. A complete line of RCA Soundheads available.





RCA DE LUXE TWO-WAY LOUDSPEAKER SYSTEMS

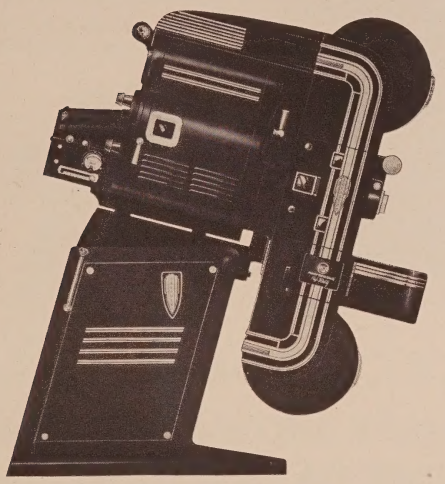
Here's a loudspeaker system any theatre owner would be proud to have. Two large directional baffles equipped with four efficient heavy-duty (30 watt) mechanisms and a three-sided extension baffle make up the massive low-frequency loud speaker assembly supplied with these systems. Both the high and the low frequency speaker units are made of the improved, and highly efficient alnico permanent-magnet material; *no power supply units are required for the speaker fields.* High sensitivity, enormous power handling capacity, and perfectly matched for balanced sound reproduction, are some of the important features. A genuine cellular horn, highly efficient coupling transformers, "regular-emergency" switch on cross-over panel, add to its performance. A complete line of RCA loudspeaker systems is available.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

RCA THEATRE EQUIPMENT

Everything for the Theatre!

BRENKERT PROJECTORS—Unmatched Efficiency—Greater Reliability—Lower Operation Costs!



Brenkert "80" Projector with Brenkert Heavy Duty Base, Brenkert Enarc Projection Lamp with Controlled Ventilation, Brenkert Steel Magazines with Streamlined Covers, and RCA De Luxe Soundhead.

BRENKERT HEAVY DUTY BASE . . . Appearance and rigidity in keeping with de luxe projection standards. Complete with arc lamp switch, but not including soundhead mounting bracket. Order as Brenkert Catalogue Number BX-10-A base with 100 ampere switch and as BX-10-B base with 200 ampere switch.

BRENKERT MEDIUM DUTY BASE (Not Illustrated). A moderately priced base of modern design and features, complete with 100 ampere arc lamp switch but not including soundhead mounting bracket. Order as Brenkert Catalogue Number BX-14.

BRENKERT PICTURE CHANGEOVER SYSTEM . . . Attached to any Brenkert mechanism without machining. Efficient and noiseless in operation. Order as Catalogue Number BX-30 mechanism and BX-20 footswitch.

BRENKERT MAGAZINES . . . 18-inch steel magazines of sturdy design. Order as Catalogue Number BX-21 upper magazine, complete with spindle, and as BX-22 lower magazine complete with takeup pulley, spindle and clutch.

BRENKERT STREAMLINE COVER PLATES . . . Complete the streamlined appearance of projection unit. Order as Catalogue Number BX-26 for upper magazine and as BX-27 for lower magazine.

Exclusive forward-looking design features, rugged construction, highest quality parts, and precision manufacturing make Brenkert the outstanding projection equipment.

BRENKERT "80" PROJECTOR

A superb projection mechanism in every respect. Costs less in the long run because its long-life construction makes for exceptionally low repair costs. Here are a few of its outstanding technical features:

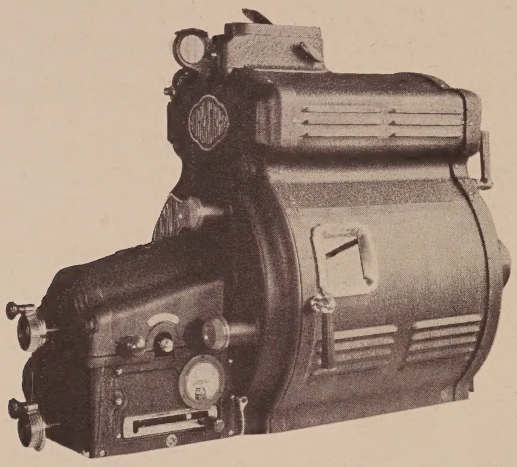
1. **Double Rear Shutters**
   - Up to 20% higher picture brilliancy
   - Clearer, more uniform picture definition
   - Minimum flicker
   - Minimum heat on film—maximum safety
2. **Rugged Enclosed Drive System Running in Bath of Filtered Oil**
   - Added reliability—no bindups
   - Long life all running parts
   - Quieter operation
3. **Special Aperture Cooling Fan**
   - Keeps aperture temperature at lower, safer level
   - Cannot cause draft through arc lamp, therefore eliminates all need for glass draft-shields
4. **Heavy Duty Precision Intermittent**
   - Long life with continual rock-steady projection
5. **Sturdy Film Trap Construction with Precision Film Stabilizing Features**
   - Makes for maximum picture steadiness for all film conditions
   - Quickly removable construction makes it easy to inspect and clean

Order as Brenkert Catalogue Number BX-80 Projection Mechanism with Dual Rear Shutters.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

RCA THEATRE EQUIPMENT

Everything for the Theatre!



BRENKERT ENARC LAMPS

. . . FLOOD YOUR SCREEN WITH MORE SNOW-WHITE LIGHT
. . . FILL YOUR THEATRE WITH MORE SATISFIED PATRONS

You'll find RCA Brenkert Enarc Lamps installed in the world's finest theatres. They give that final touch to motion picture projection that increases audience appreciation and insures continuous box office response.

Exhibitors get consistently uniform brilliant snow-white light in abundance for the best projection of Technicolor pictures in true color shadings . . . light of proper color to embellish photographic tones that make black and white pictures pleasing to the eyes of patrons.

Projectionists appreciate the unit assembly features of the RCA Brenkert Enarc that permit quick removal and replacement of assembled units for easy cleaning and service . . . the convenient back of the lamp-house installation of all moving and controlling mechanisms, away from heat and carbon dust . . . operating controls readily accessible from the rear of the machine . . . the simplicity of operation.

Theatre owners appreciate the trouble-free continuous service year in and year out . . . the long-run operating economy of more light on the screen for the same amount of power input . . . reduced maintenance and operating expenses.

Give your theatre a quality show with an RCA Brenkert Enarc—the projection lamp that never fails the box office.

OTHER IMPORTANT FEATURES

- Guides for accurate positioning of carbons
- Wide-range feed regulation
- Positive controlled ventilation
- Negative carbon adjustments made *behind* the reflector, with no chance of scratching it.
- Arc image screen in view from all parts of projection room

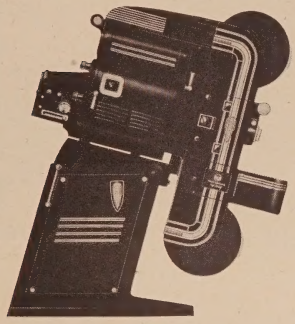
FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

RCA THEATRE EQUIPMENT

Everything for the Theatre!

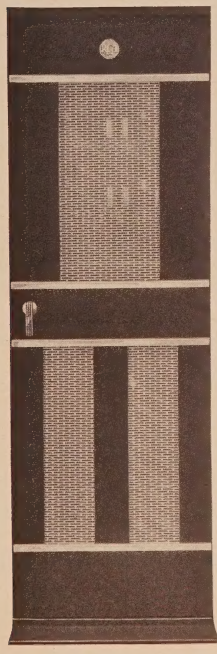
RCA DRIVE-IN THEATRE EQUIPMENT

No other application makes greater demands upon picture projection and sound equipment than theatres of the drive-in type whose popularity has progressed by leaps and bounds. The enormous size of these theatres makes efficiency count heavily in the final results. Because of its sterling quality and highly efficient design, the apparatus made available through RCA Theatre Supply Dealers has been established as the prime favorite for this newest of motion picture theatre entertainment.



DRIVE-IN PROJECTION EQUIPMENT

Utilizing screens vastly larger than indoor theatres, the light efficiency on the part of the projection lamp and projection mechanism used for these theatres assumes greater importance. Brenkert lamps and Brenkert projectors have proved, and are daily continuing to prove in drive-in theatres, that they have the efficiency to match this need. Their rugged construction, with their advanced engineering features make them the best bet for continual high class performance with a minimum of repair expense.



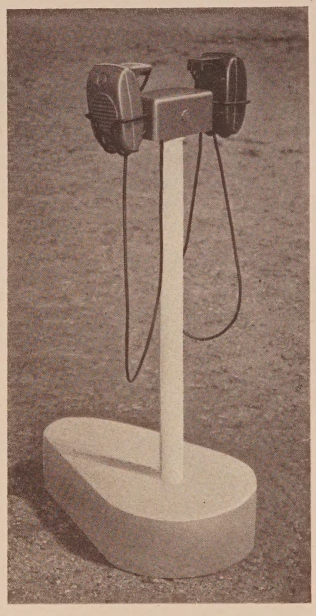
DRIVE-IN SOUND EQUIPMENT

Sound projection systems for drive-in type theatres present an interesting array of layouts suited to a variety of geographical, physical, and legislative requirements. No matter what the preference or the requirement, RCA equipment is adaptable to the situation.

SOUNDHEADS AND AMPLIFIERS

Basic equipment for all RCA sound systems for drive-in type theatres is the big PG-250 amplifier and soundhead equipment. It is conservatively rated at 125 watts minimum and can be easily expanded by the addition of extra output amplifiers up to 360 watts total undistorted output.

The PG-251 uses a 250 watt amplifier which consists of two complete channels, each capable of delivering 125 watts undistorted power output. A switch provided on the rack permits these units to be operated separately, or together, thereby providing complete emergency protection.

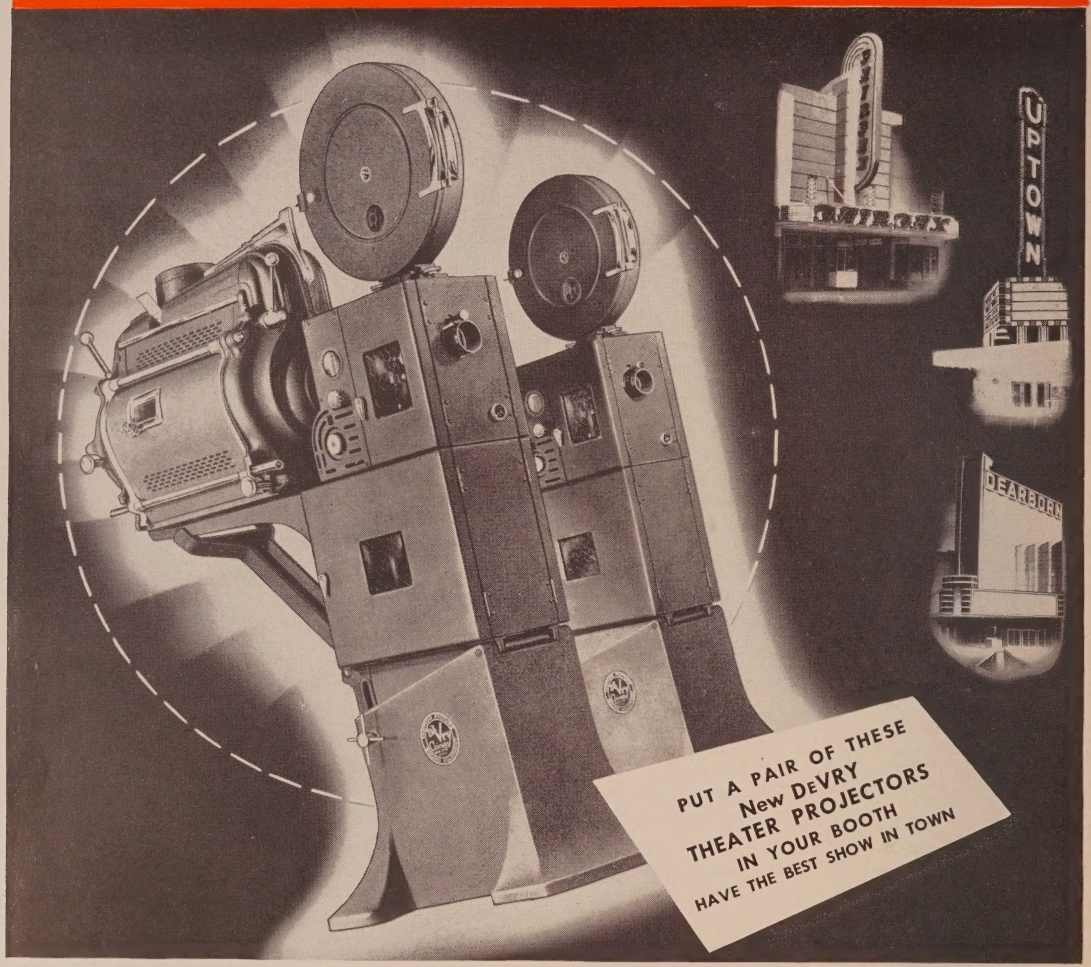


LOUDSPEAKERS

There are high quality RCA loudspeakers for every type of loudspeaker installation whether centralized, multiple above ground, or in the car. The best choice rests upon a consideration of all factors. The in-car type, however, has quickly risen to a position of outstanding popularity. First choice for these theatres is the efficient RCA In-Car loudspeaker illustrated above. It combines high quality performance with light weight and extra features making for ease in handling.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

Equipment to RELY ON



Into DeVRY's NEW Theater Projectors that incorporate BOTH picture mechanism and sound head in ONE single unit—has gone a wealth of knowledge and experience gained in the vast laboratory of war production . . . refinements in design resulting in a simplicity of mechanism and elimination of unnecessary parts . . . to make servicing and maintenance both easy and economical.

Back of the sterling performance of the NEW DeVRYS are assets of engineering ingenuity . . . improved manufacturing techniques . . . plus the jewel-like craftsmanship of men who have devoted a lifetime to the making of fine *professional* projectors.

The sturdiness of the NEW DeVRY is obvious even upon casual examination. DeVRY projectors are deliberately designed and built to outlast your ownership.

You have to see them in action to realize the rock-steady, flicker-free screening of the NEW DeVRYS—the high fidelity of their true-to-life sound from the softest whisper, the warmest tone, the weirdest shriek to the roar of a mighty organ . . . *No perceptible flutter, no hum, no wow.*

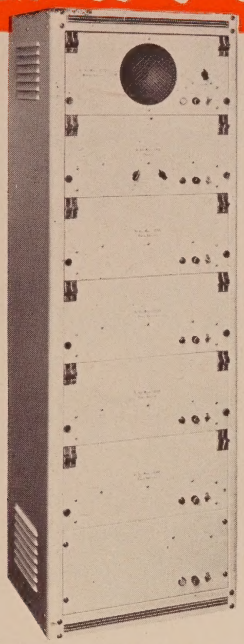
The NEW DeVRYS make it possible for any small town or neighborhood theater to give to its patrons the same deluxe projection and sound as it is now being offered in the largest and finest theaters of the world, *NEW—not rebuilt!*

Install DeVRY Precision Projectors and Hi-fidelity Sound equipment in your theater and watch audiences increase and profits grow. A request for complete information incurs no obligation. Write DeVRY. Use the postcard—postage paid for the continental U. S. A. . . . otherwise use stamps.

DeVRY CORPORATION, 1111 Armitage Ave., Chicago 14.

Your best buy is a DeVRY

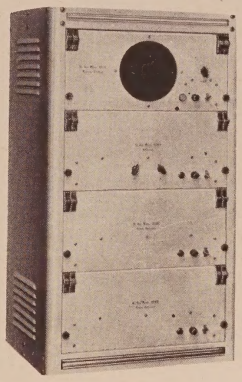
for a FULL HOUSE!

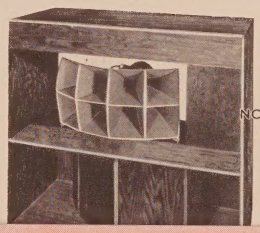


DeVRY Low Distortion AMPLIFIERS

Perfectly Matched with DeVRY Built-In SOUND HEADS and SPEAKER SYSTEMS

DeVRY amplifiers incorporate all the latest *proven* developments essential for highest quality, true-to-life, humless sound reproduction. All materials are of the highest quality obtainable for long, trouble-free performance. All wiring and assembly is top-quality, progressively inspected and tested. All electrical components are easily accessible for quick servicing. A *projectionist's idea of what is necessary for the perfect show is engineered-for and built-into your DEVRYS!*





(ABOVE)—80 Watt Amplifier—built on the easy unit-service and replacement basis—utilizing four 20 watt power amplifiers—wired to enable projectionist to use 20—40—60 or the full 80 watts as needed. Built-in, self-powered monitor speaker, equalizer panel, inputs for microphone and turnable . . . separate wide range high and low frequency response controls.

(CENTER)—40 Watt Amplifier—a dual channel unit utilizing two 20 watt power amplifiers which can be used in conjunctio to deliver 40 watts, or independently deliver 20 watts from either chann Built-in monitor speaker, equalizer pan inputs for microphone and turntable . high-low frequency response controls.

(UPPER RIGHT)—25 Watt Wall-Type Amplifier—includes built-in monitor speaker with independent volume control, equalizers for balancing outputs for dual projection. Microphone and turntable inputs, separate wide range high and low frequency response controls. Flat response within 1 db from 50 to 10,000 cycles at a low percentage of distortion.

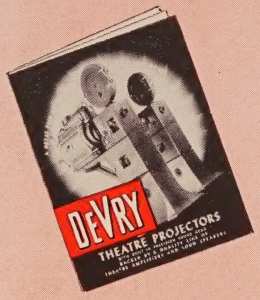
(RIGHT)—Multi-Cellular Speaker Systems—supplied by DeVRY are capable of re-

FOR FULL PARTICULARS MAIL CARD

NO POSTAGE NEEDED

DeVRY

16mm. Sound-On-Film Projector



DeVRY CORPORATION
1111 Armitage Ave.
Chicago 14, Illinois, U. S. A.

Free and without obligation, please send information checked below for theater with a seating capacity of_____ Length of throw_____.

ACOUSTICS: GOOD ☐ FAIR ☐ POOR ☐
BALCONY: ☐ YES ☐ NO

☐ DeVRY Catalog of 35mm. Theater Projectors and Sound Systems

☐ DeVRY Catalog of 16mm. Sound-on-Film Projectors and related Audio-Visual Equipment

☐ Information regarding Road Show Organization and Operations.

NAME_____

THEATER_____

ADDRESS_____

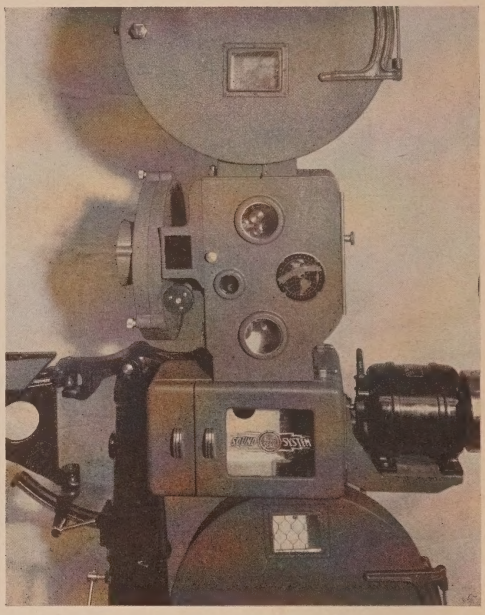
CITY_____ ZONE_____ STATE_____

Tops in AUDIENCE SATISFACTION

THE NEW

Superior 35 MM MODEL A PROJECTOR WITH BLUE SEAL SOUND SYSTEM

THE new Superior Projector Model-A has a mechanism which is both simple and rugged. This equipment is designed to give the maximum in projection with a minimum of wear and maintenance.



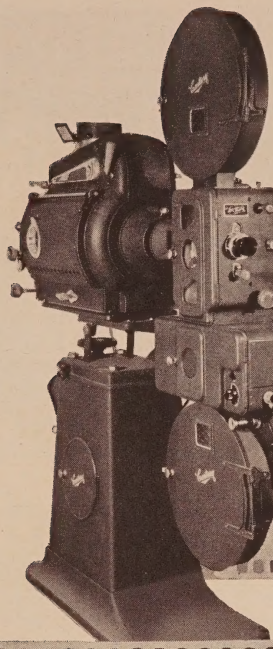
- DOUBLE BEARING INTERMITTENT
- NEW REAR SHUTTER
- STEEL AND PHENOLIC GEARS
- REMOVABLE FILM GATE
- SAFETY FIRE SHUTTER
- MICROMETER FOCUSING
- FRAMING LAMP
- GRAY WRINKLE FINISH
- MECHANICAL STABILIZER
- PRE-FOCUSED EXCITER LAMP
- ENCLOSED OIL FILLED GEAR BOX
- UNIT SUB-ASSEMBLIES

SOUND BLUE SEAL SYSTEM

Write for full particulars

BLUE SEAL CINÉ DEVICES, Inc.

137-74 NORTHERN BOULEVARD, FLUSHING, L. I., N. Y. *Cable Address:* "SOUNDFILM"



IN THE FOREIGN MARKETS
Western Electric Export Corp.

IN THE CANADIAN MARKET
Dominion Sound Equipments, Ltd.

IN THE DOMESTIC MARKET
Authorized Independent
Theatre Supply Dealers

For the first time in the history of sound motion pictures, theater projectors and sound equipment have been engineered together for maximum efficiency.

Century Projector Corporation has led the field in the design of modern projection equipment and now, in cooperation with Western Electric Export Corporation, the finest in sound reproducing systems has been wedded to the industry's outstanding projectors.

Entirely new designs of sound systems for larger theaters and excellent small equipments for smaller houses meet new Academy of Motion Picture Arts and Sciences recommendations.

The post-war Century Master Sound Systems are designed for easy adaptation in the field to any new Hollywood developments including automatic volume control, stereophonic or multi-track sound.

The Century Standard Sound Systems are especially built for the needs of the small theater.

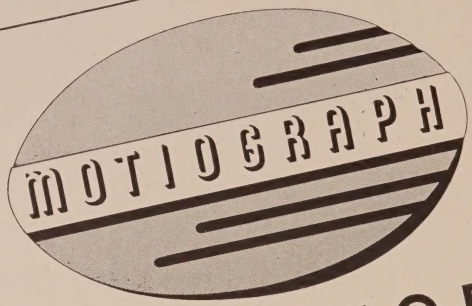
Descriptive literature may be obtained from your independent theater supply dealer or from . . .

WORLD-WIDE Century DISTRIBUTION

Century Projector Corporation

729 SEVENTH AVENUE, NEW YORK CITY, N.Y.

FOR PERFECTION *in Projection*



PROJECTORS

FOR PERFECTION *in Sound*

MOTIOGRAPH—

MICROPHONIC

SOUND SYSTEMS

Your guarantee of long years of superb, dependable, trouble-free performance. The moderate initial cost and low maintenance cost make them by far the most economical, as well as the most desirable.

See Your Authorized Motiograph Dealer

You can depend on his recommendations and ability to serve you well

MOTIOGRAPH

4431 WEST LAKE STREET CHICAGO 24, ILL.

Making fine projectors for half a century

ROYAL SOUND MASTER

DESIGNED TO LEAD - BUILT TO LAST....

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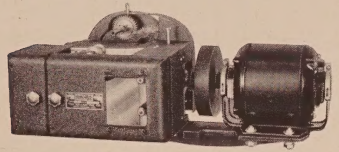
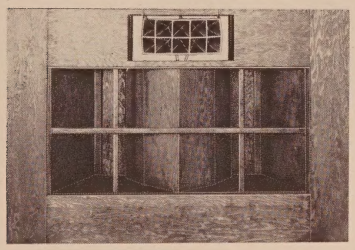
SOUND HEADS



SOUND MASTER sound heads are manufactured to meet designs and response standards of highest quality reproduction.

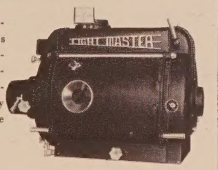
HORN SYSTEMS

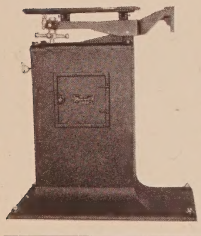


SOUND MASTER horn systems provide the ultimate in sound reproduction and perfect distribution. These horns are provided with cellular horns for highs and folded type horn baffle for lows.

PROJECTION ARC LAMPS

LIGHTMASTER high intensity projection arc lamps incorporate the extra ruggedness, heavy duty construction—mechanical precision and dependability that assures trouble-free operation and long life.

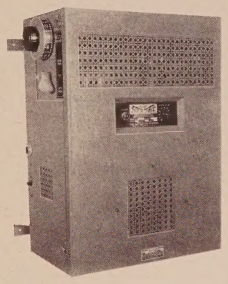




PROJECTION BASES

Designed and constructed to meet requirements of present day, modern sound reproducers, projection arc-lamps, projector mechanisms, and larger magazines . . . controls and locking devices instantly accessible . . . leveling adjustment provided for uneven floors.

THE PD-50 SERIES AMPLIFIER



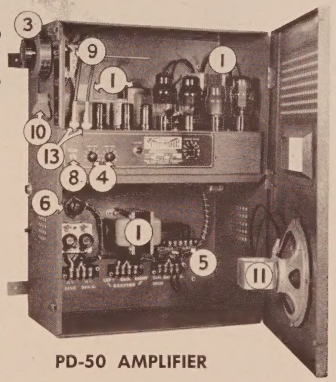
The PD-50 Series amplifier incorporates all latest developments essential for high quality, brilliant, life-like reproduction.

Climatite treated transformers and chokes. . . . Plug-in Type filter condensers. . . Calibrated step type volume control. . . . Instantaneous silent change over in photo-electric cell circuit. . . . Photo-electric cell connections through low capacity cable . . . heavy cable lock connections to amplifier . . . wide range tone control. . . . Built in booth monitor and monitor amplifier. . . . True, life-like humless reproduction . . . all these things make SOUND MASTER amplifiers *outstanding* the world over.

14 POINTS OF QUALITY

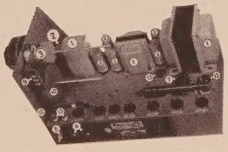
THAT MAKE THE ROYAL SOUND MASTER PD-50 AMPLIFIER AN OUTSTANDING LEADER IN THE FIELD OF SOUND REPRODUCTION AND AMPLIFICATION

1. All transformers and chokes "Climatite" treated.
2. Plug-in type filter condensers.
3. Calibrated step-type volume control.
4. Wide range tone control.
5. Exciter lamp balance.
6. Exciter supply voltage control.
7. Amplifier voltage control.
8. Photo-electric cell voltage control.
9. Auxiliary volume control.
10. Sound change-over in photo-electric circuit.
11. Built-in booth monitor and monitor amplifier.
12. Complete extra chassis available for standby protection.
13. All connections from chassis to cabinet plug-type.
14. Remote volume control and change-over available for working side of No. 2 projector.



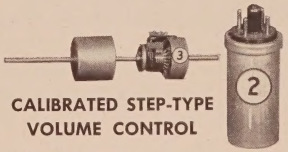
PD-50 AMPLIFIER

PD-50 CHASSIS



QUICK CHANGE CHASSIS

One look at the workmanship in this piece of equipment is enough to convince even the most critical user of the high quality of performance afforded by SOUND MASTER amplifiers. A stand-by unit of this amplifier is available for stand-by use. The entire unit can be changed in a matter of a few moments.



CALIBRATED STEP-TYPE VOLUME CONTROL

Volume, in the PD-50, is controlled by a precision, calibrated, step-type volume control of advanced design.

PLUG-IN CONDENSERS

This type makes condenser changing as easy as putting in a tube . . . no wasted time . . . no wasted effort.

REMOTE CONTROL and CHANGE OVER

This unit makes the SOUND MASTER PD-50 extra simple to operate. It brings sound control to the working side of each projector.

THE BALLANTYNE COMPANY

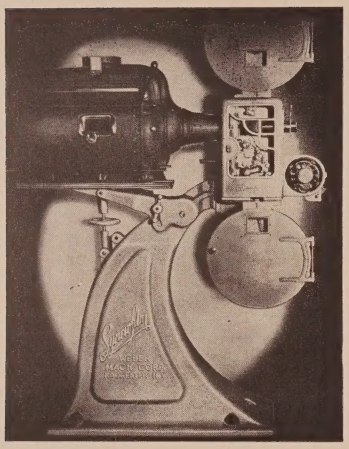
1707-11 DAVENPORT STREET

OMAHA 2, NEBRASKA, U. S. A.

Export Department: Frazar & Hansen • Cable "FRAZEN"
301 Clay Street, San Francisco 11, California, U. S. A.

Syncrofilm

PROJECTION and SOUND



The *Syncro-Dynamic* Theatre Projector is a combination of superior projection and perfect sound built into one compact unit.

MODERN IN DESIGN, CONSTRUCTION, and MATERIALS, *Syncro-Dynamic* was engineered to give long-life, trouble-free operation. The rugged construction and precision workmanship is of the highest quality. a distinguishing feature of Syncrofilm products.

Syncro-Dynamic is mounted on a new adjustable pedestal type base. Mechanism can be mounted on any standard projector base.

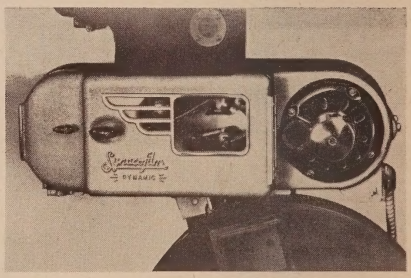
The Aristocrat of Sound Reproducing Equipment

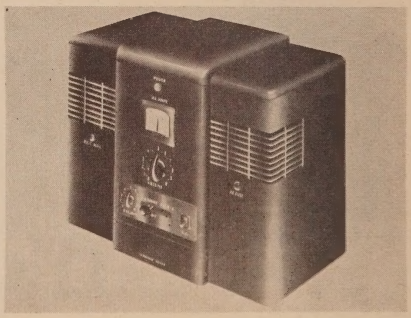
SYNCROFILM '400'

Dynamic Sound Heads represents years of research engineering in the development of a better sound head.

Featuring the new Dynamic Filter, oscilliograph tests have proven this method of controlling motion of rotary film drum superior to any other device previously used. Exacting control of film drum is essential to good sound. The Dynamic Filter assures this factor.

A new type sound sprocket and dual exciter lamps are also featured in the '400'. Syncrofilm '400' is adaptable to any standard theatre projector.





Syncrofilm
THEATRE AMPLIFIERS

are the modern way to theatre sound perfection. Many new and improved features in the field of Electronics have been utilized for greater efficiency and tone accuracy.

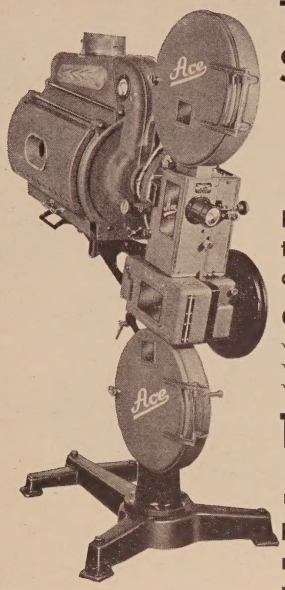
Syncrofilm Theatre Amplifiers are supplied in two models, of 20 and 60 undistorted watt output.

(Licensed under Western Electric Patents)

WEBER MACHINE CORPORATION
ROCHESTER 6, NEW YORK

EXPORT OFFICE:
13 EAST 40TH STREET, NEW YORK 16, N. Y., U.S.A.
CABLE: ROMOS

The Sound Projector of Preference



The Wenzel "ACE" PRO-4 Rear Shutter Projector Mechanism

and

WSR-2 Sound Head

Preferred by exhibitors and projectionists all over the world for their simplicity and economy of operation, and rugged dependability for year after year trouble-free performance.

Check these features of the Wenzel "ACE" PRO-4 Projector

- √ Hardened and Ground Sprockets
- √ One-piece Rear Shutter Bracket
- √ Wear-resisting Slip-in Type Gate
- √ Double-bearing Movement
- √ Self-adjusting Gate Opening Device
- √ All Shafts Hardened and Ground

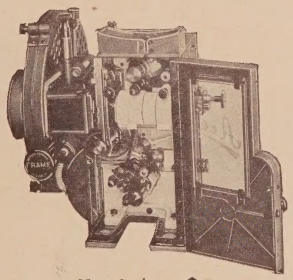
The Wenzel "ACE" WSR-2 Sound Head

SEMI-STEEL CENTER FRAME
COMPLETELY BALL-BEARING
HARDENED and GROUND SHAFTS

SINGLE SHOT OIL SYSTEM
LATERAL GUIDE ROLLER
STABILIZER

CONSTANT SPEED SPROCKET
OPTICAL SYSTEM
EXCITER LAMP

Protect your projector equipment investment by selecting equipment having more than one source of supply for future replacement parts.

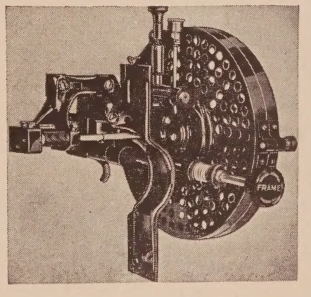


New Style D5-One Piece Door

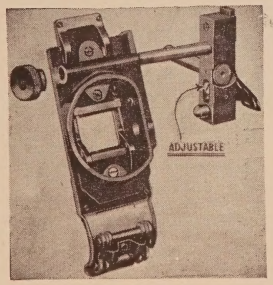
WENZEL

"Smooth Running"

PROJECTORS and replacement parts for various makes of projectors, are precision made for trouble-free operation and incorporate the highest developments in motion picture engineering.



Improved Rear Shutter

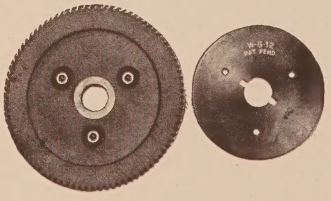


New EW-10 & EW-2

Always Striving to
MAKE IT BETTER

We are actively represented in every part of the world

Ask Your Independent Theatre Supply Dealer!



Shock Proof WG-12

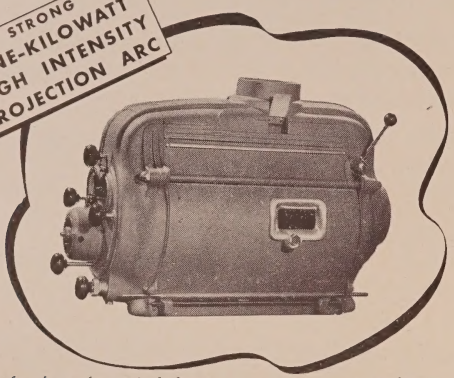
WENZEL PROJECTOR COMPANY

2505-19 SOUTH STATE STREET • CHICAGO 16, ILLINOIS, U.S.A.

STRONG
PROJECTION ARC LAMPS

As the only projection lamps manufactured complete within one factory, Strong lamps can be so engineered as to guarantee the best screen results.

STRONG ONE-KILOWATT HIGH INTENSITY PROJECTION ARC



A light for the moderate sized theatre using a screen up to 18 feet in width; where the vivid brilliancy of high intensity projection has been heretofore denied by prohibitive operating costs.

In order to secure the desired screen brilliancy with the present dense black and white films and satisfactorily present Technicolor films, twice as much light is required as is possible to project by any low intensity lamp.

This necessary doubling in light over the low intensity is made possible with this lamp at an increased combined current and carbon cost of less than 2¢ per hour.

STRONG MOGUL 45 TO 70 AMPERE HIGH INTENSITY LAMP

The Mogul High Intensity Arc Lamp has been designed to project a volume of light even beyond the normal requirements of theatres employing the modern large screens of non-reflective surface and porous structure, screens that require a tremendous increase in light volume to maintain a satisfactory level of illumination.

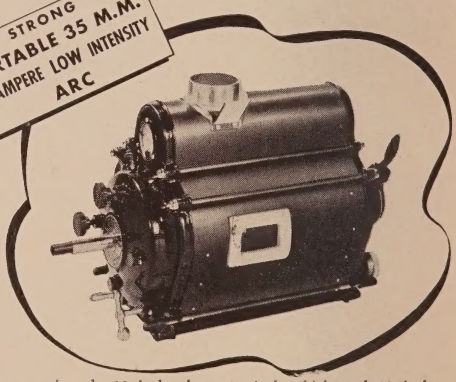
The higher efficiencies attained through the use of the Mogul result in this increased light intensity without a corresponding increase in operating costs. In fact, this improved projection is attained at a lower overall cost per light unit.

STRONG JUNIOR HIGH PROJECTION ARC LAMP

Designed especially for use on 35 mm. portable and semi-portable projectors which are used to project a large picture in auditoriums and where low intensity arcs or Mazda equipment do not project sufficient light or a light of the correct color for showing films in natural color.

The lamp burns a 6 mm. x 9 inch negative and a 7 mm. x 12 inch copper coated positive, and projects in round figures 2,000 lumens of light. Direct current for the 40 ampere 29 volt arc is supplied by a single-phase, full wave, two tube rectifier.

STRONG PORTABLE 35 M.M. 17 AMPERE LOW INTENSITY ARC



A compact unit only 18 inches long, 12 inches high, and 10 inches wide, well proportioned and having exceptional power.

The DC Carbon Arc is the only available source of light possessing sufficient power and concentration to obtain satisfactory results with portable sound equipment and using a porous screen eight to twelve feet wide.

The operation of the arc control is entirely automatic and continuous. The lamp burns at 17 amperes with a 7 mm. negative and a 10 mm. positive carbon.

THE STRONG ELECTRIC CORPORATION

TOLEDO 2, OHIO

"The World's Largest Manufacturer of Projection Arc Lamps"

STRONG RECTIFIERS

STRONG 6-TUBE RECTIFIER

Designed for use with high intensity arcs to produce exceptionally smooth output current even beyond the normal requirements of the largest theatres.

The maximum operating load is sufficiently below the capacity of the six 15-ampere tubes to result in exceptionally long life.

Regularly supplied for use on 220-volt, three-phase, 60-cycle power service. These rectifiers come in three capacities of: 50, 65 and 80 amperes.

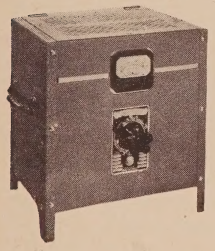
STRONG COPPER OXIDE RECTIFIER

A rugged, simple and dependable equipment for converting the three-phase alternating line supply current to direct current for use with high intensity projection arcs of from 45 to 65 amps capacity.

Transformer taps provide for adjusting the output current over a wide range of amperages and voltages.

Require no attention or maintenance. There are no moving parts to wear out, make noise or disintegrate.

Built in single lamp units and in two sizes adjustable from 45 to 50 amperes and 45 to 65 amperes.



STRONG 4-TUBE RECTIFIER

Built in two capacities, the 40-ampere single-phase for use with the 1 KW arc lamp, and the 50-ampere three-phase for use with larger high intensity lamps, adjustable from 45 to 50 amperes with 35 volts across the arc.

The 40-ampere single-phase rectifier has the exacting volt-amperage characteristics and smoothing reactance to assure a steady burning 40 ampere, 27 volt arc.

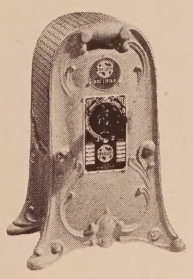
The 50-ampere 3-phase rectifier has been designed especially to supply DC power to high intensity arcs that are adjustable between 45 and 50 amperes with 35 volts across the arc.

STRONG 2-TUBE RECTIFIER

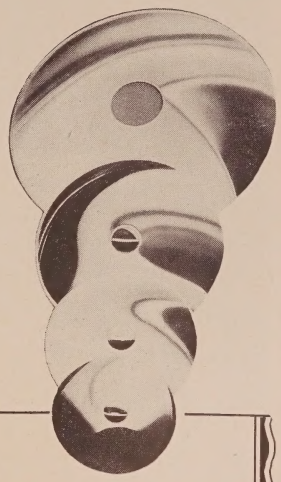
Strong has developed in this unit, that which is recognized to be the best device for converting alternating current line supply to direct current for low intensity arc operation. Two models, 15 ampere and 30 ampere, are available.

The Strong Arc Lamp Rectifier is comprised mainly of a special transformer, for changing the alternating current voltage to a potential suitable for operating the arc, a radial switch for regulating the current to the desired number of amperes, two rectifier tubes, a substantial housing, and the necessary sockets, lead wires, etc.

The efficiency of 75% attained with Strong Rectifiers means a saving in current, which will soon equal the purchase price of the rectifiers.



STRONG REFLECTORS



Since the only light which can reach the screen must be reflected by the mirror, the loss in screen light during the gradual deterioration of a reflector is in direct proportion to the loss in mirror efficiency.

Light losses through the use of worn-out reflectors, and amounting to several hundred dollars a year, are not unusual.

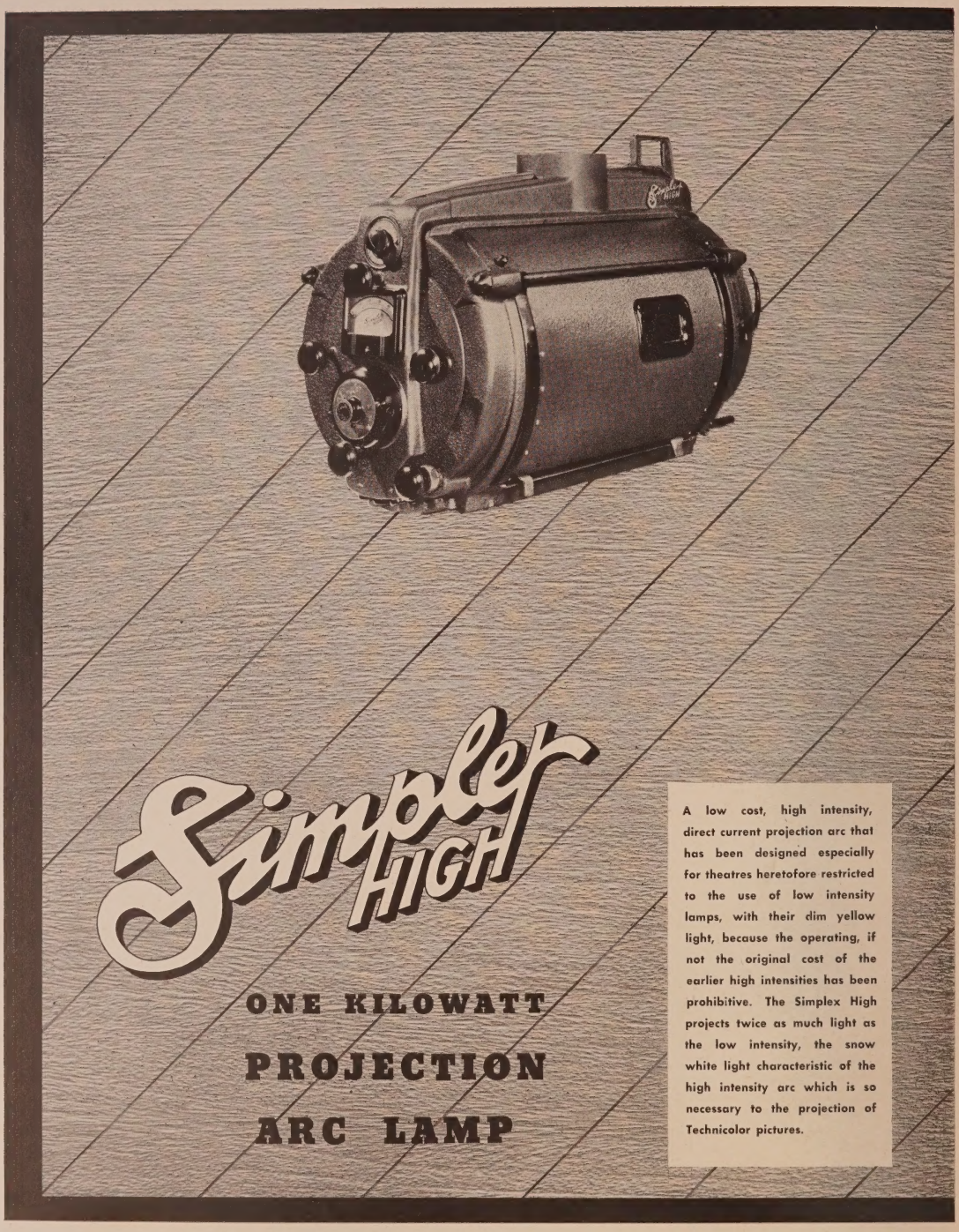
Endeavoring to make up this light loss through the use of more current similarly represents a pure waste in the form of unwarranted power bills, all of which makes the cost of periodic mirror replacement a good investment.

Strong precision reflectors have long been recognized as a dependable standard of quality. Replacement reflectors in a variety of types and sizes for use in all standard projector arc lamps are regularly stocked for immediate factory shipment.

THE STRONG ELECTRIC CORPORATION

TOLEDO 2, OHIO

"The World's Largest Manufacturer of Projection Arc Lamps"



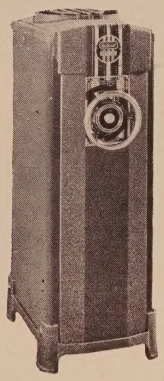
Distributed by

NATIONAL
THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

NATIONAL RECTIFIERS

6-TUBE

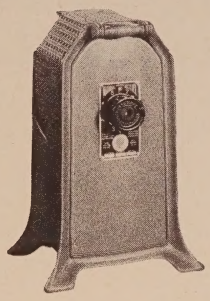


The National Heavy Duty 6-Tube Rectifier has been designed as a D.C. power supply to the Magnarc Lamp, wherever the lamp is used at high currents.

This rectifier employs six 15-ampere Tungar-type tubes, connected for full wave rectification on three-phase current which results in an overlapping in impulses sufficient to produce an exceptionally smooth output current.

The high efficiencies of this rectifier, coupled with the low price and long life of the modern tube, make this rectifier a most desirable, economical means of changing A.C. to D.C.

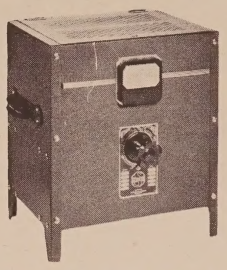
2-TUBE



More low intensity lamps today are operated from this type of rectifier than all other means of low intensity rectification combined. The low original cost, low maintenance and high operating efficiency makes the tube-type rectifier particularly suitable in the smaller theatre where economical operation is important.

Designed to withstand higher amperages, the demands of long continuous service and overloads resulting from the use of larger carbons, this rectifier is manufactured in two capacities; the large unit is adjustable from 18 to 30 amperes and the small portable unit from 10 to 15 amperes.

4-TUBE

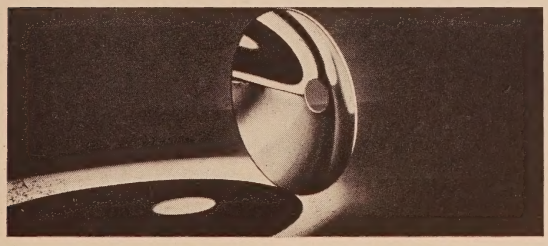


Has the built-in volt-ampere characteristics necessary to maintain the perfect power balance required by high intensity projection lamps.

The low original cost, low maintenance and high operating efficiency makes it particularly suitable in the medium sized theatre where economical operation is important.

It is built in two models. The single-phase 28-volt 40-ampere capacity rectifier is designed expressly to supply D.C. power to the one-kilowatt high intensity arcs. The three-phase 35-volt 50 ampere rectifier is used to supply D.C. power to high intensity arcs of from 45 to 50 ampere capacity.

HUNDREDS OF THEATRES *are getting* MORE LIGHT ON THEIR SCREENS *by installing*



NATIONAL REFLECTORS

All reflectors gradually deteriorate to a state where replacement cost becomes insignificant since a drop of only 10% in the reflective efficiency in your mirror results in a corresponding decrease in screen brilliancy, and represents a loss amounting to 10% of the cost of your current and carbons. Replace your mirrors regularly with new National reflectors. They are available for all types and makes of arc lamps.

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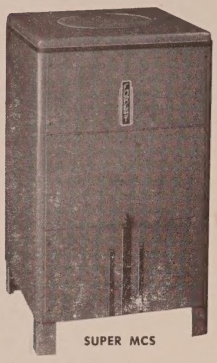
A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

Internationally Acclaimed for Perfection in Performance

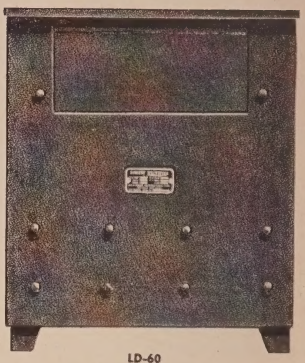
FOREST LAMPS • RECTIFIERS • SCREENS



SUPER MCS

Super MCS RECTIFIER

Forest Super Magnesium-Copper Sulphide Rectifier with the exclusive Forest transformer is internationally recognized for its superiority in every way. It gives definite assurance of protection from line voltage fluctuations. Some of the exclusive Forest features are: reliable 3 phase fan, magnetic switches, automatic voltage regulator—housed in a sturdily built modern design case. Approved by Underwriters Laboratories.



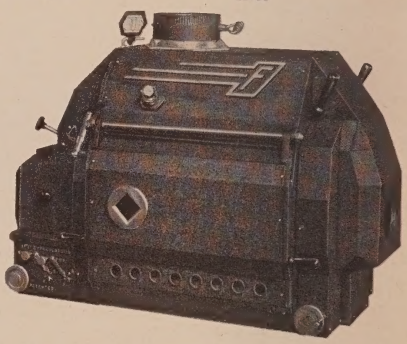
LD-60

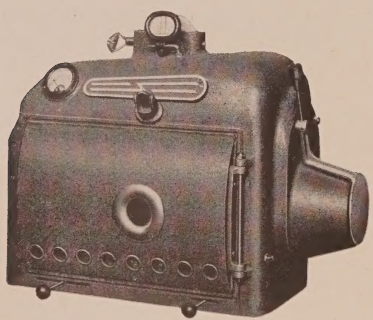
LD-60 BULB-TYPE RECTIFIER

LD-60 Bulb-Type Rectifier is acclaimed for its reliability, efficiency, and low cost power conversion device to supply projection arcs. Forest rectifiers conform in every way to the standards required for modern projection. Each rectifier serves one lamp and has an output from 30 to 60 amperes for Simplified High Intensity operation. This rectifier, with the Forest Lamp, meets the demand of the smaller theatre where an inexpensive source of light is required.

THE "UNIVERSAL TRIM" LAMP

The superiority of Forest lamps over all other lamps is the reward of long research—incorporating the highest developments in motion picture engineering. It features the new Forest carbon feed which maintains perfect focus. Does not require the operator's constant attention. 14-inch reflector. Takes any type of carbon trim—5 to 9mm. negative, 6 to 13mm. positive—thus accommodating trims for Suprex or Simplified High Intensity, Low Intensity and all new requirements. Adjustable magnetic arc control permitting greater draught and removal of burnt gases. Full adjustments provided for reflector, carbon guides and holders, independent separate control of positive and negative carbon feeds. Lamp mechanism placed where it cannot be clogged by falling particles of carbon and to ease cleaning. Many other exclusive Forest features are incorporated into the Forest Projection Lamp.





THE FOREST ONE-KILOWATT LAMP

The higher lumen rating, attained by the Forest "One Kilowatt" lamp guarantees MORE LIGHT, MORE BRILLIANT LIGHT and a PICTURE QUALITY comparable to higher arc intensity projection—and extremely economical to operate. Its superior construction and perfection of performance definitely places it in a class by itself. Although listed for "one kilowatt" projection, it can also be operated at low intensity. Due to its reserve power feature it can be operated above the rated capacity by merely changing the type of carbon and adjusting the feed control. Equipped with a 10¼" reflector for maximum light; ammeter; an "arc-a-scope" that gives perfect image of arc and visible from both sides; electric-magnetic arc stabilizer; and other exclusive Forest features. Fits all projection bases.

LD-30 RECTIFIER

Low Intensity Rectifier—a bulb-type rectifier of dependability with ample amperage leeway to insure reserve power. Housed in sturdy all steel case.

RECTIFYING TUBES

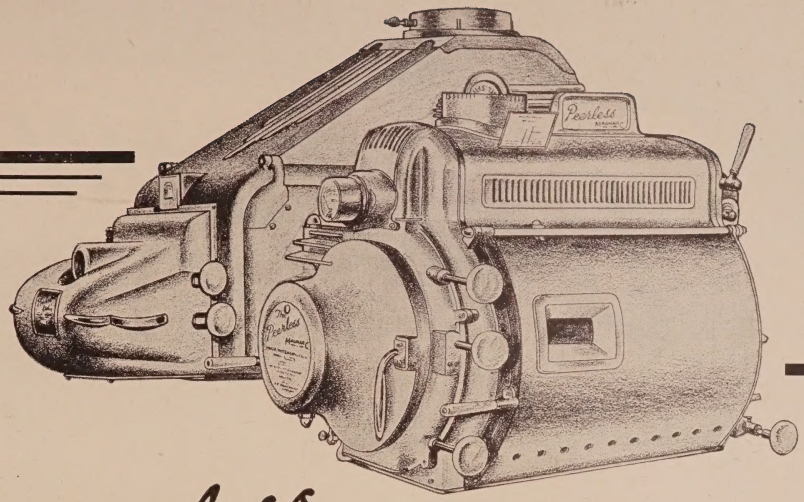
For rectifiers, power supply units and battery chargers of all makes. When used in Forest Rectifiers you are assured of maximum efficiency, reliability of operation and maximum economy.

SOUND SCREENS

The special Forest Surface-Processing Method eliminates the necessity of increasing amperage at the arc to obtain increased light on screen. They are all flame-proofed.

● *WRITE TO US FOR THE NAME OF THE AUTHORIZED FOREST DEALER IN YOUR TERRITORY*

FOREST MFG. CORP. 60 PARK PLACE NEWARK, N. J.



Peerless HY-CANDESCENT ARC LAMP TRADE MARK REG

120-180 Amperes

Peerless MAGNARC TRADE MARK REG.

1 K.W. to 70 Amperes

THE ideal back of this company's product has ever been—"that no finer product must be available to the user."

In consequence, no comparable example of engineering skill and precision workmanship will ever exist.

PEERLESS Lamps are the "Aristocrats" of the industry and share their enviable position of leadership with none.

THE FINEST ARC LAMPS EVER BUILT

J. E. McAULEY MFG. Co.

552-554 W. ADAMS STREET, CHICAGO 6, ILL.

U S A

Distributed by

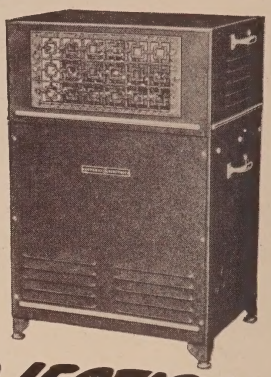
A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

NATIONAL THEATRE SUPPLY

Division of National • Simplex • Bludworth, Inc.

BACK AGAIN

COPPER-OXIDE RECTIFIERS FOR BETTER PROJECTION



Engineered to Give Low Cost.. Quiet.. Dependable Operation

Once again G-E Copper-oxide Rectifiers are available for motion picture projection service. While embodying the same tried and proved principles of rectification used in pre-war G-E models a number of improvements have been made in models now being produced. Their superiority is unquestionable.

FEATURES

***TWO-PIECE CONSTRUCTION** — Top section contains transformer and control panel. Base contains copper-oxide elements, relays and blower.

***MULTI-UNIT TRANSFORMER** — Vacuum impregnated contributes to high operating efficiency and low operating cost.

***SECONDARY TAPS** — Permit a wide range of adjustments in arc voltage and current to meet individual needs.

***COPPER-OXIDE STACKS** — Have virtually unlimited life when operated within rated capacity — require no maintenance.

***POSITIVE RELAYS** — Permit operating the unit by remote control.

The above features are just a few of many which explain why these G-E rectifiers give long trouble-free performance. For better service at lower cost install G-E Copper-oxide rectifiers for motion picture projection. G-E rectifiers are distributed nationally by the National Theater Supply. There's a branch near you. Obtain additional information from Section A1612-55, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.

Distributed by

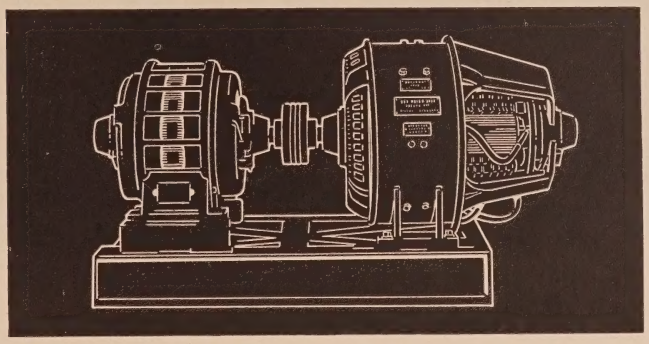
NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

For Over 30 Years, the

TransVerteR

HAS BEEN BUILT TO MEET EVERY PROJECTION NEED AND DEVELOPMENT



The TransVerteR is the world-wide leader in the motor generator field for this particular service.

Type LV	**For 1 k.w. arc**
Type HI	**For Suprex-type arcs**
Type HIH	**For Suprex and Spot arcs**
Type MA	**For high intensity arcs**
Type CP	**For high intensity spots, etc., de luxe equipment**
Type UN	**For all combinations of projection equipment**

Manufactured Exclusively by

THE HERTNER ELECTRIC COMPANY

ELMWOOD AVENUE • CLEVELAND 11, OHIO

Distributed by

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

In Canada—Consult General Theatre Supply Company

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

PROJECTION

KNI-TRON EQUIPMENT

RECTIFICATION

for EFFICIENT PERFORMANCE and DEPENDABLE ECONOMICAL OPERATION

New, Improved, Electrical Design and Mechanical Construction plus Low Cost Operation—are the built-in features of every KNI-TRON Rectifier. It Costs No More to Buy KNI-TRON Rectifiers.

NEW DELUXE KNI-TRON RECTIFIER

The up-to-date modern designed case plus the many KNI-TRON engineered features makes this unit the last word in rectifiers. The fully enclosed dial switch . . . the rugged Transformer unit . . . the mechanical mounting of the transformer directly to the supporting resilient feet of the unit, eliminates operating noises.

On the single phase Superex units the output current is filtered through a massive choke coil to assure flickerless projection.

KNI-TRON MASTER RECTIFIER

- EFFICIENT, COMPACT AND LIGHT WEIGHT.
- IDEAL FOR PORTABLE USE.
- MANY FEATURES OF THE DE LUXE KNI-TRON RECTIFIERS ARE ENGINEERED INTO THIS UNIT.

KNI-TRON 10¼" Reflector Equipment

50 to 70% MORE SCREEN LIGHT

FROM YOUR LOW INTENSITY LAMPS

No expensive new equipment to purchase. KNI-TRON 10¼" CONVERSION KITS complete with Bausch Lomb Reflectors can be installed in a few minutes.

KNI-TRON 10¼" CONVERSION KITS are made for the following Low Intensity Lamps.

PEERLESS • STRONG • MOTIOGRAPH • ASHCRAFT PREDDEY • SUNBEAM • BRENKERT MODELS "E" AND "F" POWERLITE

No Extra Operating Costs!

SPECIFICATIONS of KNI-TRON RECTIFIERS

Ref. Number	Type of Rectifier	D.C. Amps.	D. C. Volts	A.C. Voltage	Phase	Overall Dimensions	Net Wgt.	Shipping Wgt.	Tubes Required (Tungar)
15-PL	Master Low Intensity	15	50 to 55	110 or 220	Single	12x12x9	48 lbs.	54 lbs.	2-6 Amp.
30-PL	Master Low Intensity	30	50 to 55	110 or 220	Single	12x12x11	61 lbs.	66 lbs.	2-15 Amp.
30-SL	Standard Low Intensity	30	50 to 55	110 or 220	Single	22x12x9	65 lbs.	72 lbs.	2-15 Amp.
40-SH	Stand. Suprex High Intensity	40-45	25 to 28	110 or 220	Single	22x12x14	135 lbs.	155 lbs.	4-15 Amp.
45-SH	Stand. Suprex High Intensity	45-50	30 to 35	220	Three	22x12x14	137 lbs.	160 lbs.	4-15 Amp.
65-SH	Stand. Suprex High Intensity	60-65	30 to 35	220	Three	22x12x14	160 lbs.	190 lbs.	6-15 Amp.

Write for further information and prices

The Kneisley Electric Company

TOLEDO 3, OHIO, U.S.A.

RCA THEATRE EQUIPMENT

Everything for the Theatre!

RCA THEATRE SCREENS

RCA SNOWHITE SCREEN—For all types of theatres using high intensity light sources. The surface has high diffusion properties and reflects all colors equally well with 85% efficiency. It is furnished with uniform perforations, patented Evenlight perforations, or unperforated as desired.

RCA HEAVYWEIGHT SNOWHITE SCREEN—This screen has the same surface and type perforations as the Snowhite Screen. It has extra weight to supply the strength needed for the large screen sizes.

RCA SILVERLITE SCREEN—For narrow theatres using low amperage (low intensity) light sources. The surface has superior reflecting and non-tarnishing qualities, and is supported by a high quality material which may be supplied perforated for sound transmission or unperforated as desired.

BALDOR RECTIFIERS

Manufactured by the Baldor Electric Company, specialists for over twenty years in production of quality electrical equipment. Thousands of these rectifiers are giving daily satisfaction in motion picture theatres of the world. This proven, dependable, bulb-type rectifier is offered in models to cover all classes of service.

FEATURES—No moving parts—trouble free . . . Sturdy construction—reserve power . . . Easy to install—simple to operate . . . Assures clear, bright pictures.

CENTURY-ROTH GENERATORS

Highly efficient motor-generator, produces a steady source of direct current which guarantees the unvarying brilliance necessary for good screen projection.

SIMPLICITY—No small complicated parts, tubes, or relays.

STABILITY—Steady direct current output is independent of variations of voltage in the alternating current power source.

EFFICIENCY—No transformers or choke coils. Performance characteristics unaffected by age.

CAPACITY—Will withstand heavy momentary overloads.

TRUE DIRECT CURRENT—Non-pulsating, will not synchronize with shutter.

WESTINGHOUSE RECTIFIERS

Highly efficient power sources for the proper operation of Suprex types of arc lamps. Excellent performance and low operating cost.

May be installed anywhere in either projection-room or power-room. Quiet running—no vibration.

Simplicity and serviceability are keynotes of this design. Negligible maintenance costs.

Functionally designed. Front exhaust from ventilating fan prevents blocking of air. Styled and finished to match all type of projection equipment.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

J. E. ROBIN, INC.

330 W. 42nd STREET, NEW YORK 18, N. Y.

CABLE "JEROBIN NEW YORK"

MOTOR GENERATORS AND MOTORS FOR EVERY REQUIREMENT

J·E·ROBIN, INC. ★ MARK OF QUALITY ★

ROBIN-IMPERIAL

Stedypower

"The Power Behind the Screen"

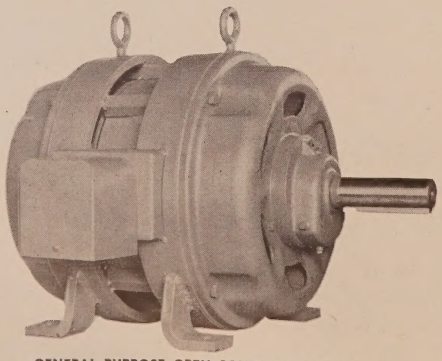
●

Standard and Custom Built motor-generators, frequency changers, Diesel electric sets for every motion picture purpose anywhere in—

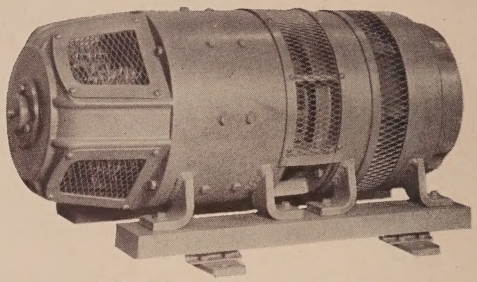
THEATRE • STUDIO • TELEVISION

Designed specifically for the service. Not just motors or generators, but a guarantee of service—power plants with 56 years' electrical know-how and 40 years' motion picture experience "Built-in!" **The means of avoiding power failures.**

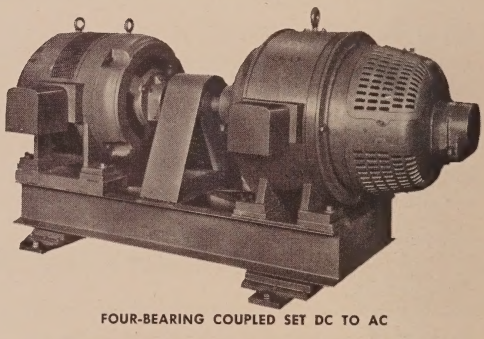
SEE YOUR INDEPENDENT THEATRE SUPPLY DEALER OR WRITE FOR LITERATURE



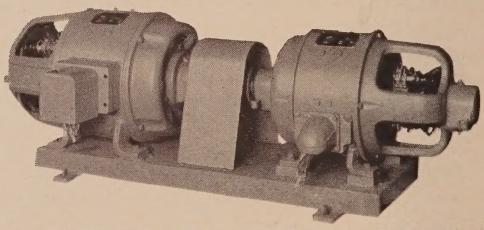
GENERAL PURPOSE OPEN SQUIRREL CAGE MOTOR



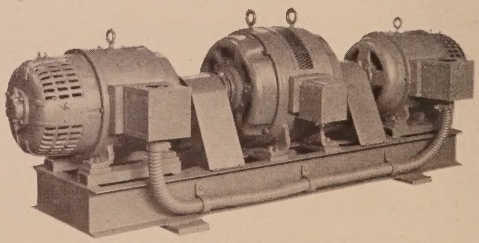
TWO-BEARING MOTOR-GENERATOR SET



FOUR-BEARING COUPLED SET DC TO AC

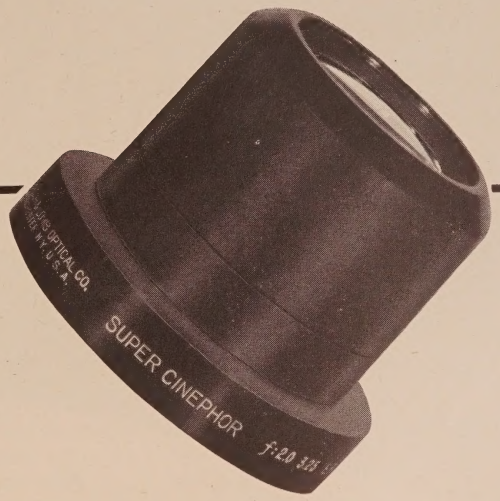


FOUR-BEARING COUPLED SET DC TO AC OR DC TO DC



THREE UNIT 6-BEARING COUPLED SPECIAL SET

Get the Best the Film Has to Offer with B&L Optical Systems



Camera lenses, optical systems used in sound recordings and reproducing, projection lenses, condensing systems, reflectors . . . BAUSCH & LOMB skill and optical precision are combined to bring to theater audiences all that can be captured on the film. Regardless of your projector filming or recording optical requirements, there's a B&L lens, or optical system to meet it.

For example: The Super Cinephor is an f:2.0 projection lens, Balcote* surfaced for maximum brilliance and definition on the screen and is available in focal lengths of 2″ to 5″ in ¼″ stops. It's a fast lens with maximum light transmission to give superb screening.

Whatever your optical problem, bring it to optical headquarters — BAUSCH & LOMB OPTICAL CO., Rochester 2, New York.

Write for Complete Information

BAUSCH & LOMB

ESTABLISHED 1853

BALCOTE* IS THE REVOLUTIONIZING BAUSCH & LOMB LENS SURFACE TREATMENT WHICH MINIMIZES INTERNAL FLARE AND REFLECTIONS AND PERMITS PASSAGE OF 30% MORE LIGHT THROUGH THIS PARTICULAR LENS

AGAIN AVAILABLE!

SNAPLITE

The Projection Lens of Quality

REFINEMENTS in manufacturing technique evolved in recent years have culminated in an even finer series of SNAPLITE projection lenses. These improved SNAPLITES, now available, are in keeping with Kollmorgen's enviable record in the projection lens field. They assure utmost image quality to keep pace with increasing perfection of projection equipment and with higher technical quality of films.

f/2.0 Series II **SNAPLITE**

Series I **SNAPLITE**

• The new Series II SNAPLITE has been carefully redesigned to produce increased illumination with a quality of image outstanding in contrast, definition, flatness of field and freedom from color fringes. Speed of f/2.0 is maintained in all focal lengths up to 5". Durable anti-reflection coatings are regularly supplied. Rugged duralumin mounts are hermetically sealed against dust and oil for lasting, trouble-free performance. Stocked in focal lengths from 3½" to 5" in ¼" steps.

• The new Series I SNAPLITE takes advantage of improvements in optical glass to produce a lens as fast as f/2.3 in the shorter focal lengths. Better color correction and improved flatness of field are combined with crisp contrast and distortion-free image. Regularly supplied in focal lengths from 2" to 7" in ¼" steps. Anti-reflection coatings can be provided if desired.

KOLLMORGEN *Optical* **CORPORATION**

2 Franklin Avenue
Brooklyn 11, New York

Better Lenses for Advanced Projection

SUPER-LITE
SERIES III-C

SURFACE TREATED

THE LENS OF SUPERIOR QUALITY

The lens without reflections or glare, thus stepping up the illumination by 20% to 25%. This exceptional increase in light is the answer to an ever growing demand for greater operating economy. Diameter 2 25/32" from 3¾" E.F. in ¼" steps, fitted for all standard projectors.

Super-Lite is also available with untreated surfaces as "Series III."

SUPER-LITE
SERIES I-A

2¾"—10" E. F.

A modification of the Petzval lens for the more discriminating projectionist. Diameter 2 1/8" for Simplex, Motiograph, and Super-Simplex projectors; 2 1/32" for Powers projectors. Improved optical corrections — a step towards our high speed Series III and III-C.

PRO-JEX
SOUND UNIT

This formula is presented after comprehensive optical studies supported by the experience of the best sound experts. The image of the slit on the film is perfectly connected and therefore the interrupted light is free from any distortion which would affect the photoelectric cell. A dust-proof and fool-proof casing insures maintenance of adjustment produced by the highest standards of manufacture and inspection.

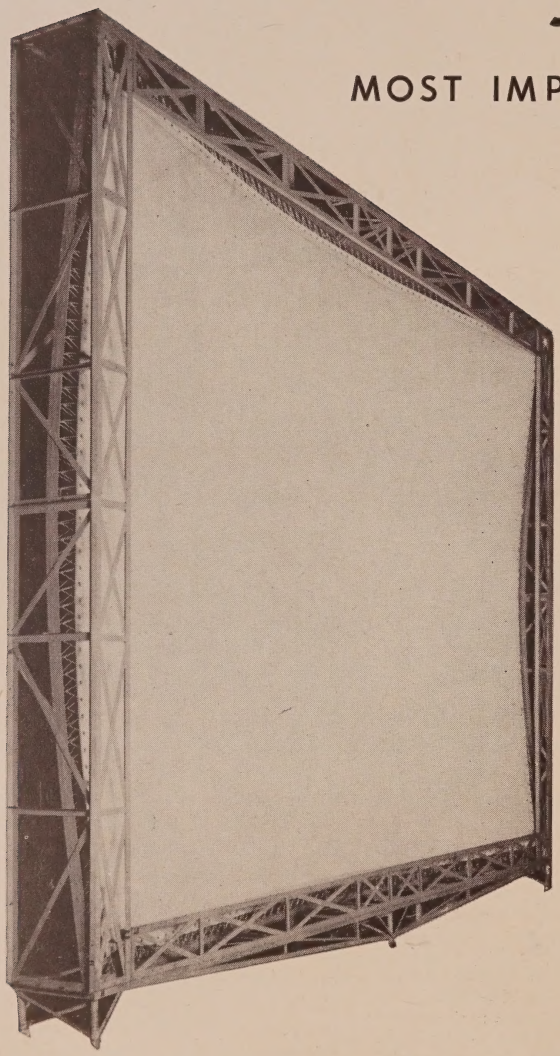
YOUR PATRONS WILL APPRECIATE THE BEST

Theatre owners and operators today, to better satisfy audiences that are highly exacting, must more than ever demand the lenses that will give them the finest in brilliance and definition, in either black and white or in life-like color. Through years of experience as manufacturers exclusively of projection lenses, the Projection Optics Company has of necessity always been in the lead in the development and production of better lenses for unsurpassed projection. Comparison with other lenses for brilliance, illumination and definition will quickly show the superiority of the Super-lite. For highest illumination the Projection Optics lenses are offered with surface treatment with hard fluorides for an additional charge, at the request of the purchaser.

Projection Optics Co., Inc.

330 Lyell Ave. dept. T46
Rochester, N. Y., U. S. A.

Tomorrow's
MOTION PICTURE SCREEN
Is Here Today!



MOST IMPORTANT CONTRIBUTION
TO MOTION PICTURES
SINCE SOUND

MAKES EVERY SEAT A CENTER SEAT

CONSTRUCTION: Revolutionary, Hypobolic-parabolic in shape, same as the retina of the eye. It is made of two one-piece sheets of Corning Fiber Glass, one sheet behind the other, laced to a curved movable steel frame. Indestructible. Fireproof. Washable. A product of the Owens Corning "Fiberglas" Corporation, Toledo, Ohio. Manufactured and installed by Sparks Withington Corporation, Jackson, Michigan.

RESULTS: No glare or hot spots. Polarizes light. Improves sound. Distortion absolutely eliminated. No eye strain. No keystoning of picture from balcony, for Every Seat is a Center Seat.

FACTS: Above facts are tried and proven. This screen has been installed, tested and used over a period of one year, under all conditions, in seven different theatres — before any national publicity was allowed to be released.

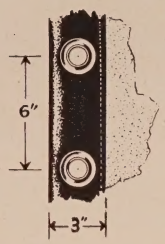
For Further Information Write

ADVANCE RESEARCH CORPORATION
214 WEST 42nd STREET NEW YORK 18, N. Y.

RADIANT Sound Screens

Reg. U. S. Pat. Off.

BRILLIANT, CLEAR, INTELLIGIBLE SOUND RECEPTION



Details of grommet spacing and installation:

LACE AND GROMMET PERFORATED SCREENS

may be had in the following types:

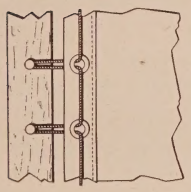
- MATTE WHITE FABRIC
- NO-FLAME MATTE WHITE

Use Radiant Sound Screens for greater clarity and detail, for crisp undistorted sound reception. Radiant Screens have a clean white matte surface of the correct density and opacity to reflect the greatest possible percentage of projected light. Pictures projected on them, whether in color or black and white, have greater brilliance and contrast. They reveal photographic depth and detail to an amazing degree.

Radiant Screens transmit sound as well as they reflect light. They have a sound transmission factor well above S. M. P. E. specifications. The scientifically spaced perforations permit the passage of all sound waves with a minimum of blur and distortion. Perfect sound reception is assured in every part of the theatre.

For greater box-office returns, for added customer sight-and-sound satisfaction, use Radiant Sound Screens.

Send today for prices and full description.



LACE AND GROMMET SCREENS

Professional type screens for any size auditorium, theatre or projection room and for outdoor use where a permanent rigid projection surface is desired. In constructing Radiant Lace and Grommet Screens, the screen surface is bound on four sides with a two and one-half inch black reinforcement tape which also serves as a border. The tape is fitted with sturdy grommets spaced six inches apart for stretching and lacing to a frame or suspension between poles.

This drawing shows how grommets are securely anchored and accurately spaced so that the open screen presents a flat, unwrinkled surface for best projection.

FRAMES FOR LACING GROMMET SCREENS

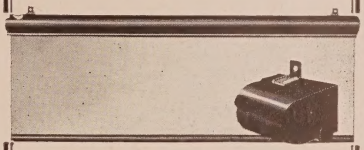
Heavy duty frames made of wood specially treated to prevent warping. Lacing hooks spaced six inches apart are attached to the front of the four side members. Quickly and easily set up. Shipped knocked down with all the necessary hardware for assembling.

SIZES OF LACE AND GROMMET SCREENS

Picture Size Feet and Inches	Overall Area Square Feet	Picture Size Feet and Inches	Overall Area Square Feet	Picture Size Feet and Inches	Overall Area Square Feet
7'6" x 10'0"	82	12'9" x 17'0"	229	18'0" x 24'0"	450
8'0" x 10'6"	92	13'2" x 17'6"	243	18'5" x 24'6"	469
8'3" x 11'0"	99	13'6" x 18'0"	256	18'2" x 25'0"	487
8'8" x 11'6"	108	13'11" x 18'6"	271	19'2" x 25'6"	507
9'0" x 12'0"	117	14'3" x 19'0"	285	19'6" x 26'0"	526
9'5" x 12'6"	127	14'8" x 19'6"	300	19'11" x 26'6"	547
9'9" x 13'0"	136	15'0" x 20'0"	314	20'3" x 27'0"	566
10'2" x 13'6"	147	15'5" x 20'6"	331	20'8" x 27'6"	588
10'6" x 14'0"	157	15'9" x 21'0"	346	21'0" x 28'0"	608
10'11" x 14'6"	169	16'2" x 21'6"	363	21'5" x 28'6"	631
11'3" x 15'0"	179	16'6" x 22'0"	379	21'9" x 29'0"	652
11'8" x 15'6"	192	16'11" x 22'6"	397	22'2" x 29'6"	675
12'9" x 16'0"	204	17'3" x 23'0"	413	22'6" x 30'0"	697
12'5" x 16'6"	217	17'8" x 23'6"	432		

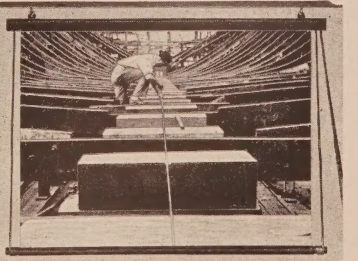
Radiant 16 MM Projection Screens

Radiant also makes a line of perforated and solid screens for 16 MM projection. Both wall and ceiling types have been used with outstanding success in schools, colleges, auditoriums, clubs, churches, all over the country. Available in sizes up to 20' x 20'.



WALL AND CEILING SCREEN
Spring Roller Type—Model EC

Ideal for either wall or ceiling use. A powerful spring holds the screen in exact position at all times. Available with light weight metal cover which protects the screen from dirt and damage. For *added* brilliance, "HY-FLECT" fabric—the glass beaded surface made famous by RADIANT—can be supplied whenever a nonperforated Screen is required.

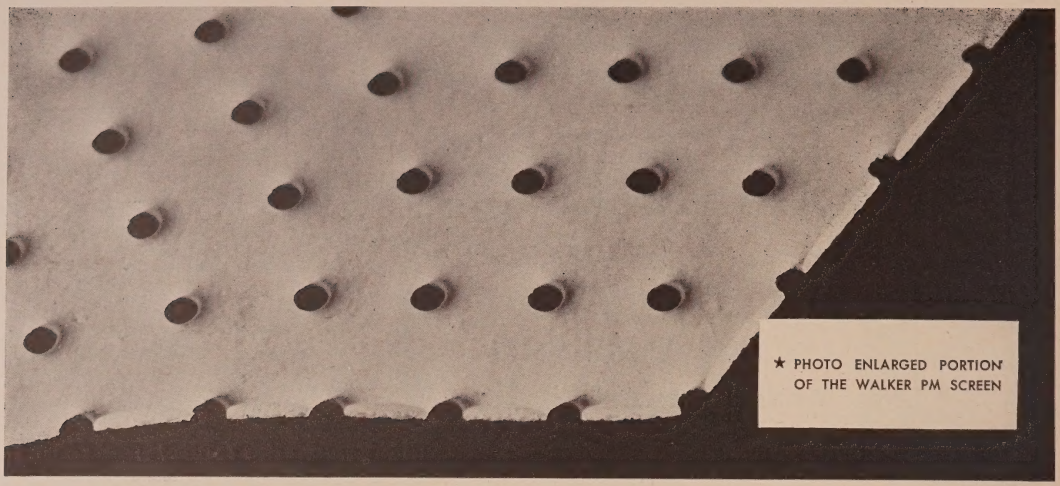


Rope and Pulley Type—Model WE

Raised and lowered by ropes, this screen automatically locks in any position. Attached to the lower edge of the screen surface are two strong, wooden halfrounds, forming a roller which holds the screen in perfect alignment when lowered.

Write today for catalog with complete description and prices of Radiant 16MM Projection Screens.

RADIANT MANUFACTURING CORP., 1140-46 West Superior Street, Chicago 22, Illinois



WALKER PLASTIC MOLDED SCREEN

BRINGS NEW RICHNESS AND BEAUTY TO THE FILM IMAGE

This unique construction adds, to the picture, new BRILLIANCE, DEPTH and REALISM. Widespread use by American and Foreign exhibitors since its introduction in 1940 is proof of its practical qualities. The durable molded plastic surface delivers superior projection and sound throughout its long life.

PM–is molded of tough, durable plastic in a continuous surface without seams up to 22′-6″ x 34′-0″.

PM–sound transmission holes are molded in the shape of smooth flaring horns. The holes are not perforated.

PM–has a surface of tiny curves giving depth to the screen.

PM–plastic surface is hard and smooth which resists dirt and lends itself to quick effective cleaning.

PM–produces a strong illusion of depth in the picture.

PM–sharply reduces distortion from side seats, improves front seat viewing.

PM–provides clearer sound . . . better high frequency audibility.

PM–performance can be maintained at top efficiency for at least three years by cleaning with Walker P.M. chemical cleaner.

WALKER - PM - SCREENS

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

Distributed Exclusively by

NATIONAL THEATRE SUPPLY
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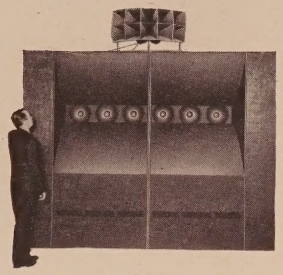
The Standard of the Studios...

in your theatre



First time we heard it, we knew we had scored a superb triumph in electronics. Here is the loudspeaker that sounds like 1956 – that brings the studios' standards of sound reproduction to your theatre. And why not? It is the very same quality speaker that Altec Lansing developed for the major motion picture studios in Hollywood . . . the speaker through which they judge their own productions.

No showman who has heard THE VOICE OF THE THEATRE ever asked: "Is it worth the change from my old equipment?" Men with vision know that newly devised recording techniques will demand wider range and greater authenticity in reproduction, and will make THE VOICE OF THE THEATRE a "must" in every house.

Patrons will be looking for this sign on your boxoffice window. It identifies those houses which have installed THE VOICE OF THE THEATRE.

For further information see your local theatre supply dealer, sound system manufacturer or Altec representative. If you are purchasing a new sound system, it will not be completely modern unless it is equipped with THE VOICE OF THE THEATRE.

This theatre is equipped with

The VOICE OF THE THEATRE

Greater Listening Pleasure for your Patrons

SOUND EFFECT REALISM

From the subtlest whisper to thunderous climactic effects, sound reaches your audience in all its blood-tingling realism, just as it was recorded in Hollywood. No frequencies, high or low, are lost on the sound track.

GREATER EFFICIENCY

The reproducing efficiency of your sound system is greatly increased with exactly the same power you are now using. Your VOICE OF THE THEATRE, *with wide dynamic range, delivers true quality and naturalness of all music, dialogue and sound effects.*

LIVING PRESENCE

THE VOICE OF THE THEATRE *brings authentic reproductions of the human voice to your theatre . . . makes screen images living, breathing characters and reproduces tones through the full range of all musical instruments.*

COMFORTABLE LISTENING

Even distribution of sound eliminates "poor seats" and assures every patron easy, comfortable listening—free of strain and irritation. When they leave your theatre they are rested, relaxed and satisfied.

A TRUE BASS REPRODUCTION

THE VOICE OF THE THEATRE *overcomes the barriers of reproducing bass. Now sound effects, voices and musical instruments in the lower frequencies can be reproduced in full color and true character.*

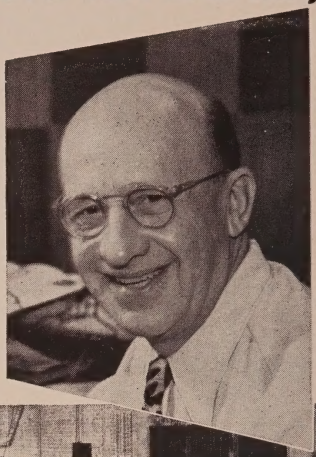
ALTEC
LANSING CORPORATION

HOLLYWOOD, CALIFORNIA • 250 WEST 57th ST., NEW YORK, N.Y. • IN CANADA: NORTHERN ELECTRIC CO.

Give Your PROJECTIONIST *the changeover that does the job*

Thirty-five years of projection booth experience taught me the keen desire of every projectionist to give the *"perfect show."* It was for this purpose that I, a projectionist, 26 years ago, developed the Strong Zipper Changeover to aid the projectionist! The start of World War II saw the Strong Zipper Changeover in wide use in theaters everywhere. But thereafter military needs demanded our entire production. Now with Victory ours, the Strong Zipper Changeover is again available to aid you in giving the *"perfect show."* New Strong products—*developed by a projectionist for the projectionist*—are in the making. Watch for them!

Larry Strong



The Strong Zipper Changeover is the *only* changeover on which the speed is adjustable . . . the *only* changeover guaranteed by *both* manufacturer and jobber. The Strong Zipper Changeover and its attached foot switch contain no rods, connecting bolts or lock-springs to jam or wear out, thereby disrupting an otherwise perfect performance. Strong Zipper Changeovers are available for all standard projector makes and models.

For the Perfect Show Insist on a Strong ZIPPER

Audiences today demand a perfect show. Give your projectionist the tools he needs for uninterrupted performance.

Instant synchronized, noiseless changeover of both sight and sound is yours with the Strong Dual-Purpose "ZIPPER" — the changeover that was designed and built by a projectionist to help projectionists meet audience demands.

To change over sight alone *(but not sound)* specify STRONG ZIPPER CHANGE-OVERS, listing at $86.25 per pair, including foot switches.

To change over BOTH sight & sound, specify DUAL-PURPOSE STRONG ZIPPER CHANGE-OVERS, listing at $125.00 per pair, with foot switches.

REEL END SIGNALS for all projectors. Does not touch film or reel, thus eliminating film scratching. Strictly mechanical, requires no batteries, no transformers, no governors, and no presetting. INSTALLED in 5 MINUTES. Priced at $9.75 each.

STRONG ZIPPER CHANGEOVERS for all makes and models of projectors and ESSANNAY REEL END SIGNALS are handled by Theatre Supply Dealers everywhere. Export sales are handled through *Western Electric Export Corporation*, 111 Eighth Avenue, New York 11. Literature on request . . . FREE!

AN ESSANNAY ELECTRIC MANUFACTURING PRODUCT

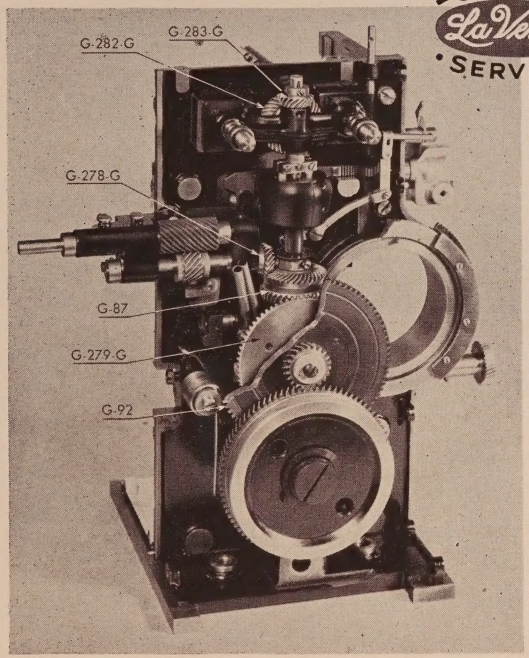
STRONG'S *Zipper* CHANGEOVERS

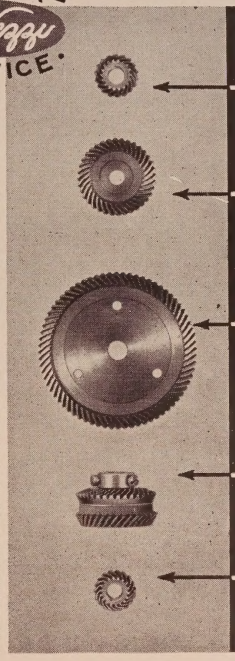
ESSANNAY ELECTRIC MANUFACTURING CO. . . 1438 NORTH CLARK STREET, CHICAGO 10, ILLINOIS

Spiral Bevel Gears

for Quiet Operation *and* Longer Life

-SUPER- La Vezzi SERVICE





G-283-G Vertical Shaft Top Spiral Bevel Gear (Replaces G-138-G)

G-282-G Upper Sprocket Shaft Spiral Bevel Gear (Replaces G-139-G)

G-279-G Intermediate Spiral Bevel Gear (Replaces G-135-G)

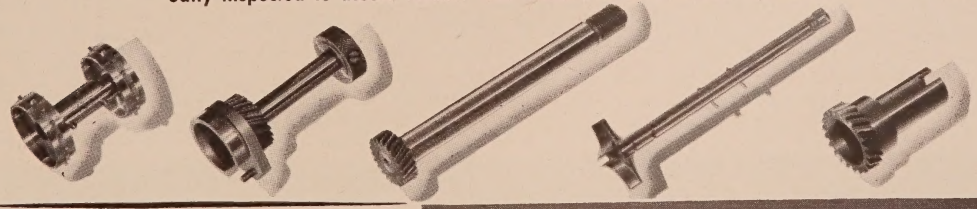
G-87 Double Spiral Bevel Gear and Clamp (Replaces G-13)

G-278-G Shutter Driving Spiral Bevel Gear (Replaces G-115-G)

They maintain continuous pitch line contact. The oblique, curved teeth engage gradually instead of coming into full contact at once like straight bevel gears. Always more than one pair of teeth in contact to share the load. And LaVezzi Spiral Bevel Gears *run themselves in with oil.* No grinding or lapping compounds required—eliminating need for clearing destructive emery out of gears and bearings.

FINEST QUALITY, PRECISION-MADE PROJECTOR PARTS

Guaranteed interchangeable. Made to extremely close tolerances and individually inspected to assure trouble free installation and smooth operation.



Available Through Independent Theatre Equipment Dealers

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MACHINE WORKS
180 NORTH WACKER DRIVE • CHICAGO 6, ILL.

To facilitate inquiry re the above, please mention this volume and page number. 365

THANK YOU . . . FOR A JOB WELL DONE!

We give thanks, with the rest of our 130,000,000 neighbors, *for a job well done!* During the trying days now behind us, our fighting men gave all they had—and hand-in-hand with Industry here at home, heralded a bright new future for all of us.

We at Projection Products are proud of our war record in the manufacture of precision projection parts. Before Pearl Harbor, we strove to maintain the highest quality in our products, and this reputation was furthered by the fine, accurately precisioned parts that met and excelled the most rigid government specifications.

The experience gained was abetted by our new, spacious, well-machined factory of modern design. Today, Projection Products is your assurance of an even better product than ever before.

Play Safe . . . get the best!

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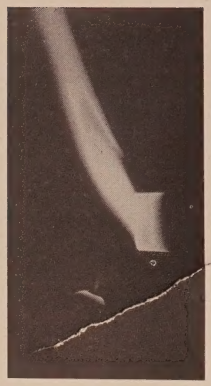
National

TRADE-MARK

PROJECTOR CARBONS

FOR EVERY TYPE OF PROJECTION LAMP

Sold through Authorized Distributors



SCREEN LIGHT AVAILABLE FROM HIGH INTENSITY PROJECTION LAMPS

Type of Lamp		Type of Carbon	Size	Maximum Recommended Arc Current Amperes	Arc Volts	Maximum Screen Lumens 90° Shutter	Maximum Screen Width with 9 Ft. Lamberts at Center— 75% Screen Reflectivity
Condenser Type		High Intensity, White Flame Positive "Orotip" Cored Negative	13.6 mm x 22 in. $\frac{3}{8}$ or $\frac{7}{16}$ in. x 9 in.	130	69	4350	23.7
Simplified High Intensity		Suprex Cored Positive Suprex Cored Negative Suprex Cored Positive Suprex Cored Negative	7 mm x 12 or 14 in. 6 mm x 9 in. 8 mm x 12 or 14 in. 7 mm x 9 in.	50 70	36 40	2950 4800	19.5 25.0
One Kilowatt Arcs	D.C.	Suprex Cored Positive "Orotip" C Negative	7 mm x 12 or 14 in. 6 mm x 9 in.	40	27.5	2150	18.0
	A.C.	Copper Coated H.I.A.C. Forward Copper Coated H.I.A.C. Rear	7 mm x 9 in. 7 mm x 9 in.	66	22		

The words "National" and "Orotip" are trade-marks of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

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HIGH INTENSITY PROJECTION

The history of screen lighting, even from the beginning, has been one move after another to obtain more and better light. High intensity projection has always produced enthusiastic response from theatre patrons, since they notice and show favorable reaction to the improvement resulting from installation of this type equipment.

High intensity lamps provide a greater volume of screen light than the older low intensity lamps. This allows a clear cut screen image to be shown in the presence of a safe and comfortable level of general illumination. Patrons entering the auditorium from the lobby find their seats without discomfort or embarrassment, while the lighter contrast between the screen and surrounding illumination adds to visual comfort in viewing the picture.

A further advantage of the high intensity arc for projection is the snow white quality of its light. Light from the low intensity arc is comparatively dull and yellowish. This distorts the hues of color features and detracts from the impression of realism which color is designed to create. High intensity projection reproduces all colors with great fidelity and gives a realistic quality to color features not otherwise obtained.

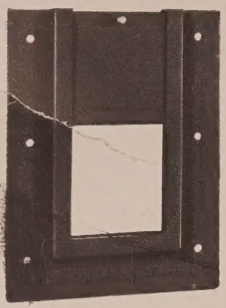
"ONE KILOWATT" ARCS

From the standpoint of the small theatre, the "One Kilowatt," high intensity arc ranks among the most important advances in the art of motion picture projection. It enables the smallest theatre, at little or no increase in operating cost, to have the advantages of snow white projection light and the recommended level of illumination on the screen. It removes the edge enjoyed by those theatres having the more expensive types of high intensity lamps.

One of the most important objectives in preparing for future business is improvement in the quality and quantity of screen illumination, especially since increased production in color films is expected. No theatre will be a modern theatre without high intensity projection.

The "One Kilowatt" arc, without increasing operating cost, now allows the small theatre to give its patrons 50 to 80 per cent more screen light, more realistic color reproduction and a quality of picture presentation unsurpassed by any theatre, regardless of size.

"BEST" FIRE SHUTTERS STEREOPTICONS • SPOTLIGHTS •



"BEST" FIRE SHUTTERS MEET ALL INSPECTION LAWS

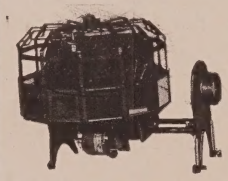
Protect yourself against fire and other emergencies in your projection room. Protect yourself with "Best" Fire Shutters—a shutter that satisfactorily meets all state and city inspection laws, which require gravity doors or shutters on portholes of projection rooms. "Best" Fire Shutters and "Best" Shutter Controls prevent smoke from spreading into auditorium. And they last, because they are made of heavy 10 gauge steel. Grooves for drop plates are welded to back plate. Drop plates are ¼" plate—will always DROP. Complete and ready to install.

Extra grooves for ¼" glass included on all Types "F," "SF," and "L" Shutters.

INFORMATION FOR ORDERING

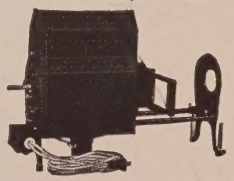
FIRST number is WIDTH, and SECOND number is HEIGHT. Give width of Projection Booth. Specify "WITH COUNTERWEIGHTS" if counterweights are wanted on the Type "SP" Shutters. When figuring openings for "Best" Port Shutters remember—(1) That the overall height of the shutter is always twice the height of the opening plus 5" for framework. (2) That the overall width is the width of the opening plus 6" for framework. (3) The overall width of a counterweighted shutter is the width of the opening plus 10" for framework. (4) Openings should not be spaced close enough together to cause one shutter to overlap another.

"BEST" AUTOMATIC SLIDE PROJECTOR



An ideal slide projector for continuous operation, comes in three sizes, 500, 1000 and 1500 watt. May be used in projection booth, in lobby or on roof with outdoor screen. Powered by heavy duty motor and completely foolproof. 500 watt model accommodates ten slides—1000 and 1500 watt models, twelve slides.

"BEST" 1500 WATT SLIDE PROJECTOR

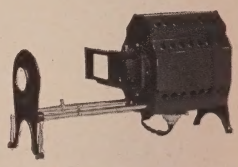


A high powered, hand-operated slide projector. Delivers twice as much light as a 1000 watt projector and is for use on exceptionally long throws or where an exceptional amount of screen illumination is needed. All "Best" Slide Projectors come complete with mirror, heavy-duty cord and switch. In addition, the 1500 watt models are equipped with Heat Absorbing Glass as a protection to the slides.

500 WATT BESTEREOPTICON

The ideal projector for the small theatre, classroom, lecturer, church, and photographer. High efficiency and low price make the 500 watt Bestereopticon unusually popular for distances up to 75 feet. A trial will convince you that this projector delivers screen results that are equal to those of much higher priced projectors. Leatherette Carrying Case available.

"BEST" 1000 WATT SLIDE PROJECTOR



A projector for general use that has found a place in theatres using high intensity lamps for their film projectors, and especially where the distance to the screen exceeds 75 feet. Lamp and mirror adjustments on ALL "Best" Slide Projectors are on the OUTSIDE where they are cool and easy to get at. Leatherette Carrying Case available.

"BEST" WONDER SPOTLIGHTS

400 Watt Model **Model "6"** **1000 Watt Model**

For Footlights, Spotting Lobby Displays or anywhere that a concentrated beam of brilliant white or colored light is needed. Easily adjusted for spot or flood. Come complete less bulb.

ACCESSORIES

Pipe Clamps
Hand Color Wheel for 400 watt Spot
Same as above but for 1000 watt Spot
Automatic Color Wheel for 400 watt Spot
Same but for 1000 watt Spot

FIXTURES FOR 150 WATT R-40 LAMP BULBS

No. 17 Lowboy Lamp Holder
No. 75 Clip Up Lamp Holder
No. 155 Automatic Color Wheel

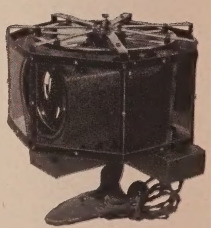
"Best" Pee Wee SPOTLIGHT

A 75 - 100 Watt Spotlight

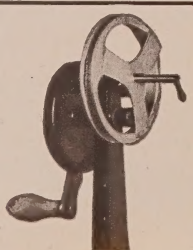
Now—a small, yet powerful light at an amazingly low price, FOR SHORT RANGE WORK—HIDDEN LIGHTING EFFECTS, ETC.

Bestomatic COLOR SPOTLIGHT

AUTOMATIC COMPACT POWERFUL



Seven colors used on color wheel, adjustable to spot or flood. Standard model for use on Alternating Current. DC model available.



"BEST" REWIND PULLEYS

FOR SIMPLEX REWINDS
Two Sizes—5" - 7"

"BEST" Copper Terminal Lugs

(SOLDERLESS)
Made to Last

"BEST" Automatic COLOR WHEEL

For the PAR-38 and R-40 Lamps

A compact motor-driven revolving color wheel enabling you to have a constant color change from the new G.E. Spotlight or Floodlight Lamps. Equipped with 13" color wheel, universal action "U" bracket mounting, and heavy base. Standard model for use on 110 volt 60 cycle current; other models available.

"BEST" HEAVY DUTY Carbon Savers

For all Low Intensity and Suprex Type Lamps (Suprex type not shown)

PRODUCTS OF

Best Devices Co.

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CLEVELAND, OHIO

Order from your
Independent Theatre Supply Dealer
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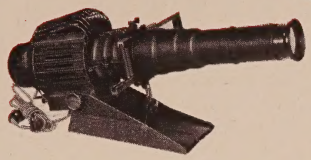
National Theatre Supply Company

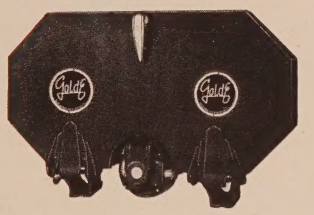
Equip with GoldE FOR PRECISION QUALITY ADVANCED DESIGN REAL VALUE . . .



Blower Cooled
AIR-FLO STEREOPTON

Lamp capacity up to 1000 watts . . . for clearer visibility and longer projection distances. Quiet motor-driven forced air cooling *plus* heat filter protects slides against heat damage. Cooler handling all around. Precision optical system assures perfect clarity of image. Choice of several standard lenses. 3 ground and polished condenser lenses furnished. All-steel welded construction. Adjustable bellows. Built-in tilting device. Shows standard 3¼" x 4" stereopticon slides. Silent two-place slide carrier. Easy access to parts. Compact . . . stable . . . conveniently portable.

All over America . . . and all over the world . . . enterprising theatre owners are equipping with *GoldE*. The experience of these thousands of exhibitors is a guide in choosing equipment that serves long and well. To assure more efficient operation and maintenance in booth, box office and lobby . . . investigate *GoldE* value. It is the clean-cut result of intense research, advanced design ideas, and precision manufacturing.

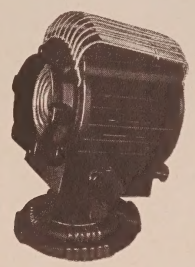


Model "D-H"
Automatic Enclosed REWIND

Offers many features pioneered by, and exclusive with, *GoldE*. Super-silent. Super-safe. Extra-strong. U.L. approved — eliminates fire hazard. Micro-Switch safety cut-off — when door *opens*, motor stops! Positive friction — will not clinch film. "Tilt-back" case — *reels can't fly off!* Motor does not transmit torque to operating parts. Reel-drive Dog prevents broken keys. Plenty of power. Modern, compact design. Assures trouble-free long-life operation.

Handsome Streamlined
TICKET BOX

Enhances the appearance of any theatre lobby. Sturdily constructed of 20-gauge steel. Cast aluminum top finished in black baked enamel. Bottom of cast iron. Steel ticket hopper. Piano hinge door. Cylinder lock with 2 keys. Sand blasted glass window in attractive modern design. Scientifically engineered. Chrome handles. Lifetime service. Mar-proof baked enamel finish. Choice of standard colors: Mandarin Red, Royal Blue, or Burnt orange. (Special colors at slight extra cost.)



500 Watt High Efficiency
BANTAM SUPER-SPOT

Professional-type. Throws powerful beam of clear, brilliant, shadowless white light. Spots down for punchy highlighting or diffuses to even flood with easy, push-pull control. 4½" Fresnel heat-resisting lens. Special guard protects hands. Universal mounting. Perfectly balanced — *easy to handle.* Overall height 12", length 10", width 6½", weight 8lbs. Also available in 1000-watt blower cooled model.

Also ask about these other GoldE Products:

Carbon Waste Cans • Sand Urns
Round Tables • Changeovers
Cleaning Stands • Take-ups
Blower-Cooled Slide and
Strip Film Projectors

AVAILABLE THROUGH LEADING THEATRE SUPPLY DEALERS

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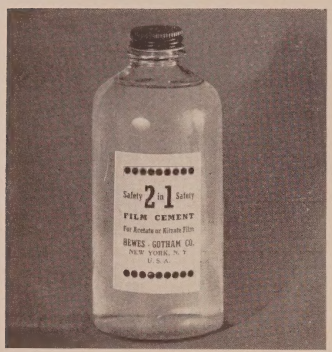
Designers and Manufacturers of Booth and Box Office Equipment for Over 25 Years

THE PREFERRED ESSENTIALS

ONE BRAND QUALITY PRODUCTS



FILM CEMENT

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SECTION 2-E

HEATING, VENTILATING *and* AIR CONDITIONING

1945

Drafts Will Hurt the Box-Office Receipts

The Cause of Drafts and Their Elimination Through Use of Air Diffusers Is Explained

By T. W. REYNOLDS

The difference between success and failure of a theatre air-conditioning system may not be caused by some complex mechanism or action of mysterious origin back in the refrigeration equipment. More likely it will be due to the lack of a simple piece of the right equipment at the duct outlets of the system.

True, a good compressor, fan, and coil do have an important bearing upon the final results, but they alone do not assure successful air conditioning. Even though the air be filtered, cooled, and piped to the outlets in the orthodox manner, the system may be a failure if the air is then thrown or dumped upon theatre patrons as though the process were finished—when, in fact, it has only begun.

CAUSE OF DRAFTS

The definition of a draft should be given at the outset. It is a term loosely used, a variable with the individual, his condition of health, and the season. A draft is caused by unequal exposure of parts of the body to an air motion which localizes body sensations to one's back or feet rather than to the body as a whole. More heat is then removed from some sensitive part of the body than that part normally dissipates. If that does not register on one's conscious mind as a feeling of discomfort, it will register the next day as a stiff neck or a sore throat. Of course, some slight degree of turbulence of air must be present in any system where proper air circulation is maintained.

Before air distribution became a precise art, the design of registers or grilles on duct outlets was based solely upon appearance and the size necessary to pass the volume of air required for heating. Drafts were not so readily produced by air-heating equipment, since the heated air floats upward. With the introduction of theatre cooling, however, the heavier, cooled air tended to fall upon the audience so quickly that mixing or dilution with the warm air of the theatre took place around the patrons, instead of in the ceiling area above them.

In order to prevent this cold air from coming in contact with the patrons, air-conditioning engineers tried introducing only slightly cooled air in greater volumes. But the necessary increased volumes of slightly cooled air created more drafts due to the more rapid air movement. In addition, the greater volumes of slightly cooled air required larger equipment and resulted in higher operating costs. So one got back to where he started. It was all a vicious circle.

It was soon recognized that with ordinary registers or grilles on duct outlets, no system of theatre air-conditioning could avoid being drafty. Regardless of whether slightly cooled air or very cold air was introduced into the theatre, you always had drafts with these outlets. Except for the discomfort of drafts, however, the introduction of very cold air had one decided advantage. A given amount of very cold air took up more heat from the theatre air than an equal amount of slightly cooled air. Hence, much smaller volumes of very cold air were required and equipment and operating costs were lower.

DRAFT ELIMINATION

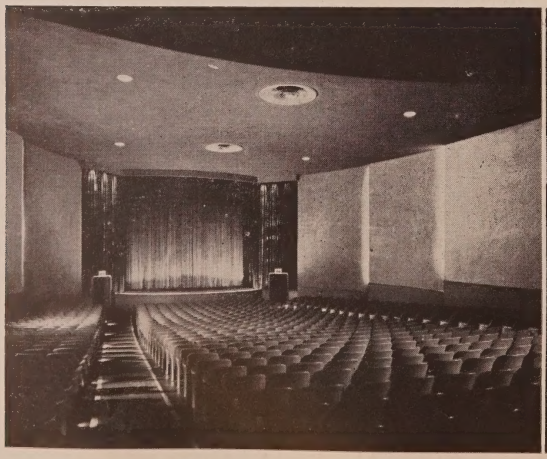
Research and experience in air distribution has shown that all that is required to eliminate drafts from air-conditioning systems, using either slightly cooled or very cold air, is the use on duct outlets of an air diffuser which pre-mixes the supply air with the theatre air entirely above the audience zone. In other words, an air-diffuser which pre-mixes the supply air and the theatre air within the diffuser itself.

Such a device equalizes the temperature and humidity of the air mixture by thorough diffusion of the air mixture within a short distance from the outlet, away up above the audience. All of the advantages of very cold incoming air can be obtained with such an air diffuser —smaller volumes of supply air, lower operating costs, and less expensive equipment.

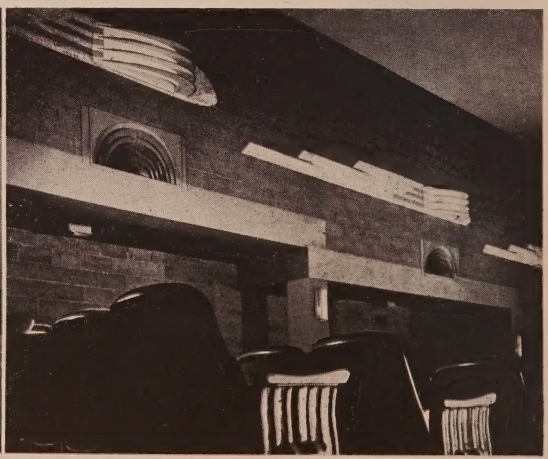
First attempts to design a ceiling air-diffuser culminated in the pan-type outlet. This was nothing more than a hole cut in the ceiling with a simple pan or plaque below it to hide the hole. The pan also acted as a crude and temporary block to cold air currents which usually dropped immediately to the floor below.

The performance of this type of outlet is affected by the ceiling construction and

GENERAL VIEW of the auditorium, toward the stage, of the Hollywood Theatre, Sioux Falls, South Dakota, shows ceiling Anemostats, which provide draftless distribution of conditioned air through the whole orchestra area. Note also the effective utilization of the stage draperies, and side-wall-trough lighting.

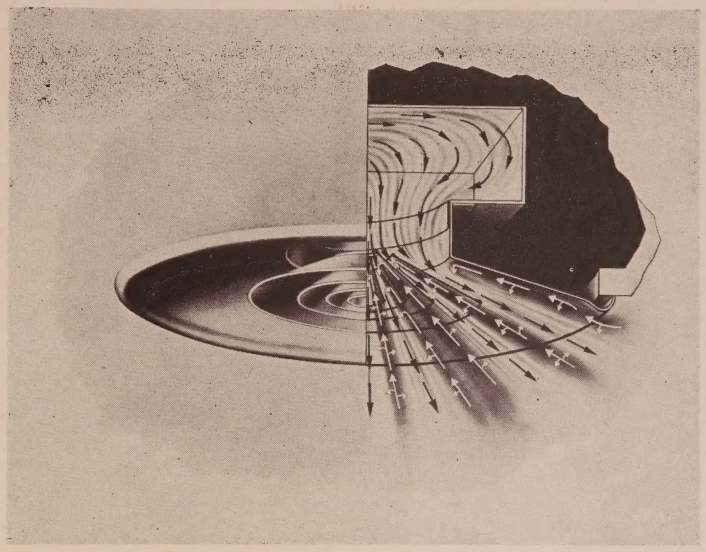


SINCE THE WIDTH of the Luna Theatre, Chicago, is relatively small, wall-type Anemostat air diffusers were sufficient to complete air distribution without drafts. These diffusers replaced the conventional type grilles when patronage began to fall off due to drafts obtained during the season of air cooling.



cannot be calculated. The air is discharged in only a single plane and simply blows against and down the walls. Under such circumstances, the entering air is difficult to control and must be supplied at a temperature close to the room temperature. There is no pre-mixing of the air and there is only a limited mixture with theatre air. Further objections are the unequal distribution of the air within the theatre, and streaking of the ceiling by the incoming air.

In earlier days, the cooling effect of conditioned air was over-advertised outside the theatres by the signs that we still remember, such as "Arctic Breezes," "Siberian Zephyrs Inside," "Greenland's Icy Mountains," "Never over 70 Degrees," and "Cooled by Refrigeration." The last phrase often made one think of a cold-storage plant or an unheated house. Coolness or warmth, however, did not necessarily mean comfort, especially in those days when the humidity was kept high, for it cost plenty to keep it down. In theatres where humidity is kept high, this is an added reason for using a good air-diffuser to prevent uneven distribution of humidity with its accompanying areas of clamminess.



THE METAL CONES of the Anemostat are designed so that air of any duct velocity, passing between them, creates a series of counter-currents of theatre air. At the same time, air expansion within the cones converts air-velocity energy into a blanket pressure on the air below. In this way, supply air is pre-mixed with about a third of its volume of theatre air before it is spread throughout the theatre in a series of slow-moving blankets.

AIR DIFFUSERS

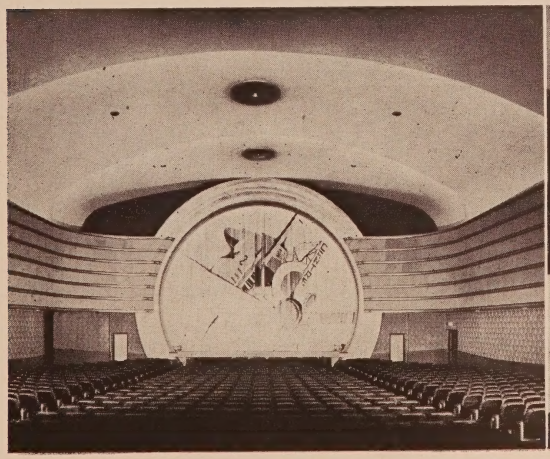
Fortunately, research has not been static. Complete and modern testing facilities now exist where all variations of temperature from extreme heat to extreme cold have been tested with various volumes and velocities of air in different types of outlets. Research in air distribution culminated in the type of air diffuser shown in the accompanying illustrations, a device known as the Anemostat. Its name is a tough word, not easily spelled or pronounced. The Greeks, who had words for everything, are responsible. They had "anemos," meaning wind and "statikos" meaning causing to stand. So we draw out the Anglicized combination to mean a device which causes the wind to stand still, and, thus a combined pre-mixer and air-diffusion control for the purpose of introducing cooled or heated air into the theatre without discomfort to anyone.

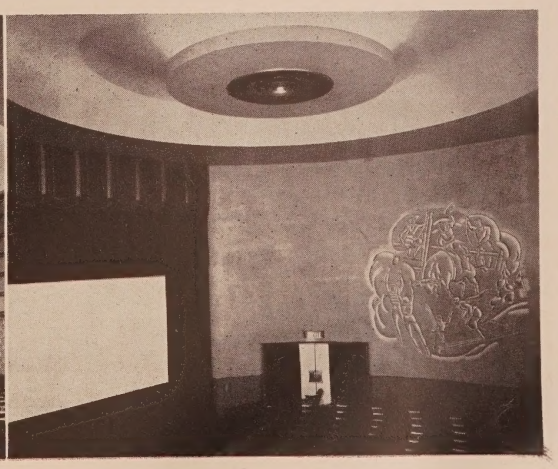
Function

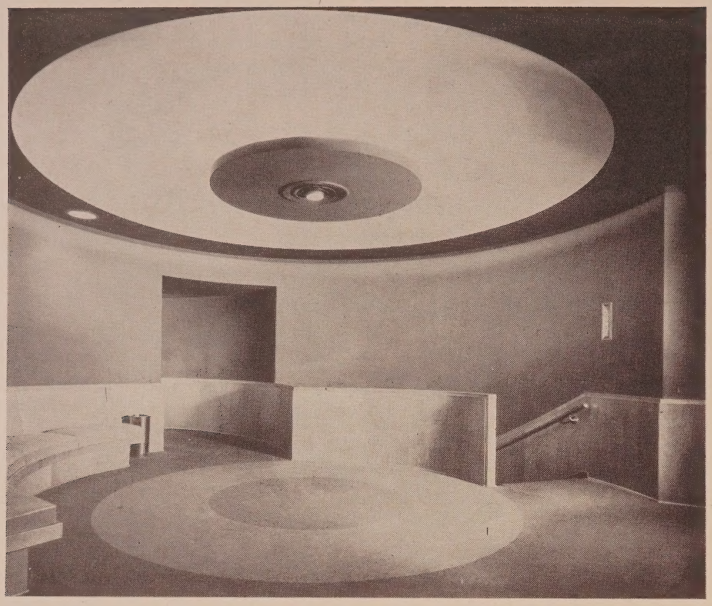
As shown in the picture, the Anemostat consists of a series of cones placed within each other in such relationship that the air is discharged in definite proportions, not only radially for a full 360 degrees, but also hemispherically in a series of planes. This discharge creates multiple counter-currents of room air at low velocity which are siphoned into the diffuser and therein mixed with the incoming air stream. In this way 30 per cent of the theatre air is pre-mixed with 70 per cent of the incoming cooled or heated air before the total volume of 100 per cent is discharged into the theatre. This pre-mixing and diffusion produces a prompt and satisfactory equalization of temperature and humidity both vertically and horizontally throughout the audience. Mixture is so rapid, with both aspiration and diffusion occurring equally close to the device, that a single

THE MANAGEMENT of the Centre Theatre, Baltimore, had tried to eliminate drafts by blowing in larger volumes of "not quite so cold" conditioned air, but finally turned to Anemostat air diffusers for the solution of the problem. The equipment is shown here installed in the ceiling of the theatre's auditorium.

CIRCULAR DESIGN of the Anemostat harmonizes pleasantly with the ceiling treatment used in conjunction with the indirect lighting in the auditorium of the Trans-Lux (52nd Street) Theatre, New York. All pictures used in this article are through the courtesy of the equipment maker, Anemostat Corporation of America.







IN THE LOBBY of the Hollywood Theatre, Sioux Falls, South Dakota, a ceiling Anemostat, in combination with a lighting fixture, is mounted in the bottom of the indirect lighting trough. The circular design of the diffuser harmonizes pleasantly with the circular ceiling treatment used in conjunction with the indirect lighting. Note also the complementary treatment and use of the colors in the carpeting of this circular lounging area.

diffuser can distribute large quantities of air at high temperature differentials, yet without creating more than adequate air movement throughout the audience.

Two of the flaring members or cones act as injectors only, while the other cones have the dual functions of ejectors and injectors. This results in what is called aspiration, in other words, a suction which entrains the room air. Aspiration is not to be confounded with secondary air motion or air-volume motion, which is just an expression of how often a given volume of air is moved in a given space before it is extracted from the space.

Use of Air Diffusers

There are a number of advantages, foreign to the main purpose of this device, of service in ironing out headaches which would otherwise be difficult to overcome with air-conditioning systems. For example, the effects of any delayed action of the automatic controls are not so noticeable because of the well diffused air, while the absence of drafts and any over-cooled or under-cooled spots keep the controls more steady and free from erratic operation. For the same reason, the location and size of theatre duct outlets become of less importance and fewer may be used. High duct velocities and any fluctuations in the supply of conditioned air are also less noticeable.

This air diffuser is often used also as a cure for the ills of a sick air-conditioning system, since, within reason, it accepts things as they are, takes them as they come, either high or low velocities. In a sick system, stepping up to higher velocities will help out where the heat in the theatre has increased, or where it has been under-estimated.

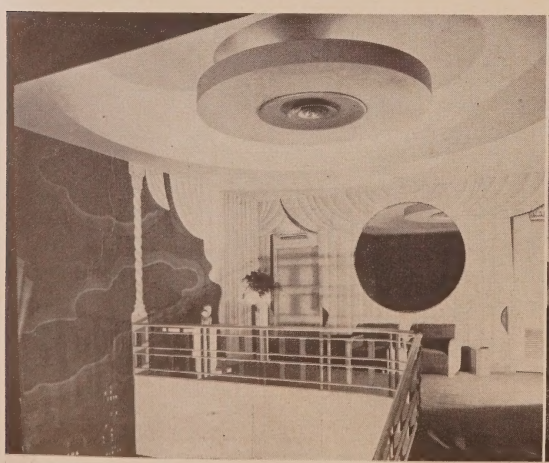
From all that has been said, it will be seen that duct sizes can be substantially reduced where these air-diffusers are installed. This is because the Anemostat makes possible both higher velocity and lower temperature of the cooled air in summer or higher temperature of the heated air in winter.

Other Applications

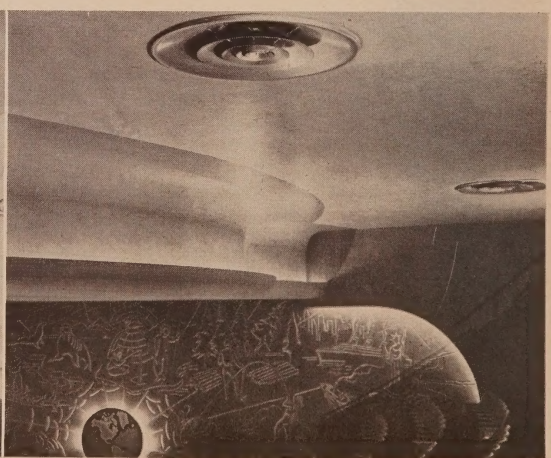
This air diffuser needs no manual supervision, has no directional louvres, and nothing moves within it but the air. It can be blended effectively with modern schemes of decoration in theatres, creating varied and unusual effects, and it can be combined with light fixtures or light effects.

A still further application is in connection with the critical spots in a theatre, such as the extreme rear of the balcony, as well as immediately under the balcony in theatres where the ceiling heights are low. Here a wall-type design may be used, for it operates the same as the ceiling-type, except that radially it diffuses only over 180 degrees.

THE UNUSUAL ARCHITECTURE of the upper foyer of the Trans-Lux (52nd Street) Theatre, New York make draft-free air distribution very difficult. An Anemostat has been installed in conjunction with the light fixture to minimize the difficulty. Note the upper position of the mural as part of the lower foyer decoration.



AMONG THE MORE MODERN THEATRES, from the point of view of architectural design and interior decoration, is the Trans-Lux (85th Street) Theatre, New York. Here an Anemostat air diffuser has also been used as a ceiling fixture. Note the symbolism of the back-lighted "world" and its tie-ins with the wall decorations.



Radiant Heating Becomes Modern Theatres

Raising the Temperature of the Cold Walls Proposed as Alternate to Heating the Air

There are two prime responsibilities that a theatre manager or owner has toward his patrons. One is providing the best possible entertainment for their enjoyment. The other is designing and furnishing his theatre for their maximum comfort.

It is this latter responsibility which has prompted architects, engineers, and specification writers on projects involving the construction of new theatres or the renovation of existing ones to incorporate the most modern designs in their plans.

Ever-increasing attention has been focused recently by these designers on the use of floor-type radiant heating for theatres. Radiant heating, a method of providing indoor comfort during cold weather, has entered into the spotlight only during the past decade, although the principle involved has been known for nearly 2,000 years.

BACKGROUND INFORMATION

The theory of radiant heating was applied nearly 2,000 years ago by the Romans who circulated hot gases from charcoal fires through built-in ducts to keep walls and floors warm. Not much is known, however, about the progress of radiant heating until about 40 years ago when an English inventor, A. H. Barker, noticed that one of the rooms of his home was much more comfortable than the others during the winter time, although the air temperature in that room was the same is in other rooms.

He found the reason for this was that the walls of the more comfortable room were heated by concealed furnace flues. He then installed hot water pipes in the walls of the other rooms and was successful in obtaining similar comfortable results. From then on, radiant heating was developed steadily in England and parts of the continent.

In America, too, there was a growing interest in this unique method of heating. In 1909, a small school near Gary, Indiana, was built with steam pipes for radiant heat suspended between the floor joists over which a conventional wood floor was laid. In 1928, wrought iron pipe was installed in the concrete floor of Sacred Heart Church, Pittsburgh, Pennsylvania, to provide radiant heat. The system still is operating successfully.

It has been estimated that nearly 2,000 radiant heating systems have been installed in the United States in many types of buildings—schools, churches, airplane hangars, garages, offices, homes. Now the theatre industry, looking forward to the inclusion of the latest and most modern designs in postwar showhouses, turns to radiant heating as a solution of heating problems.

First American theatre known to have installed a radiant heating system is located in Jewell Valley, Buchanan County, Virginia. Management of this 350-seat theatre reported that the radiant heating system worked very satisfactorily during the first heating season it was used, 1944-1945. That season, incidentally, was one of the most severe for that part of Virginia.

Based upon the scientific fact that the normal human body generates more than enough heat to provide comfort for itself, but loses this heat to surrounding colder surfaces, radiant heating's purpose is to warm these colder surfaces by means of coils or grids of heating pipe embedded in floors, ceilings, or walls.

Scientists have found that the human body, while generating more than enough heat to provide comfort for itself, loses this heat in a number of ways, most important of which are convection, radiation and evaporation. Loss by convection is described as being that heat which is carried away from the body by the passage of air over the surfaces of the skin and clothing. Radiation loss is that heat given off or abstracted by colder objects around the body. Evaporation loss represents the heat necessary to transform surface moisture on the body into vapor.

RADIANT HEATING

There are two ways to avoid cold: by raising the air temperature to a sufficiently high degree (the conventional method) or by raising the temperature of the cold surfaces surrounding the body (radiant heating).

The only difference between radiant heating and conventional hot water heating systems is that comfort conditions in radiantly heated areas are controlled by large, low-temperature surfaces, while conventional systems are small, high-temperature surfaces, such as radiators. In a radiant heating system, the same type of boiler and controls may be used as are used for any ordinary hot-water heating plant.

Design

As to the design of a radiant heating system, selection of materials and operating equipment, these vary with the architectural design of the building and are left largely to the judgment of those planning the construction.

The first step in designing a theatre radiant-heating installation is calculation of the rate of heat loss from an auditorium in much the same manner em-

ONE OF THE FIRST STEPS during the installation of a radiant-heating system is spreading the fill, as workmen are shown doing in this photograph. Several different types of fills may be used, but on the job shown in the picture, crushed rock was utilized. Wrought iron pipes for the radiant-heating system are laid on the fill and are then completely covered with a concrete slab to form the floor of a room free from visible heating fixtures.

RADIANT-HEATING COILS MAY BE FABRICATED in a contractor's shop or welded together as needed at the site of the job, as the men in this photograph are doing. One of the reasons that so many contractors specify wrought iron for radiant-heating projects is because of the ease with which this ferrous metal may be welded.

BENDING PIPE FOR A RADIANT-HEATING SYSTEM is facilitated by a simple rig used by the workmen pictured here. The reason that most contractors chose wrought iron for use in radiant-heating installations is that it is, in comparison with the materials that might have been used, not only easily bent but more workable.

ployed when a conventional heating system is involved. Once the total of all heat losses is known, the next move is to determine the heating requirements, usually expressed in the units of heat per hour per square foot of panel surface. Then it is possible to install the heating system for maximum effectiveness.

Installation

Radiant heating systems are installed in the floor by laying coils or grids of wrought iron pipe on a gravel or crushed stone fill and then covering the pipe network with concrete.

In the selection of piping material, consideration must be given to four important factors: The pipe must transfer heat with the smallest possible difference in temperature; it must be mechanically strong and be able to expand at the same rate as surrounding materials; it must resist corrosion, and must be conducive to easy bending and welding into a durable unit.

FLOOR ISLANDS present no problem in a radiant-heating system, inasmuch as the coils may be bent with comparative ease to by-pass them, as indicated by this picture. The heating coils rest on small concrete piers, so that the pipes will be completely embedded when the floor is poured. Wrought iron and concrete, having the same expansion coefficient, eliminate the possibility of cracking the concrete floor slab when the heat is turned on.

The vast majority of radiant heating installations have been made with wrought-iron pipe, inasmuch as this material has been time-tested for corrosion resistance, expansion properties, and ease of fabrication.

A sloping floor—such as those installed in most theatres—is no problem in a radiant heating system. The majority of systems operate on a forced-circulation feed from the hot-water boilers. Fact is, many systems are designed on an incline purposely to facilitate gravity drainage.

Although the floors of most theatres are of concrete, a radiant heating system may be installed in wood floors as well. Also important is the fact that the floor temperature—whether it be wood or concrete—never exceeds normal body temperature in a proper radiant heating system. Floor covering—carpet, asphalt tile, linoleum and various monolithic surfaces—are in no way affected by the heating elements.

Any of the conventional automatic control devices may be used on a radiant heating system. Common type room-air thermostats have been employed in hundreds of installations. In larger structures, such as theatres, churches and factories, it is considered advisable to anticipate comfort demands by using control devices actuated by fluctuations in outdoor temperatures. Since variations in outdoor temperatures usually precede changes in indoor temperature, it follows that if the heating plant is started in advance these temperature changes can be compensated earlier.

Operation

Operation of a radiant heating system is essentially the same as the operation of any conventional hot water system. Any type of fuel—gas, coal, fuel oil—may be used with equal success. The boiler can be located in a utility room, partial basement or full basement.

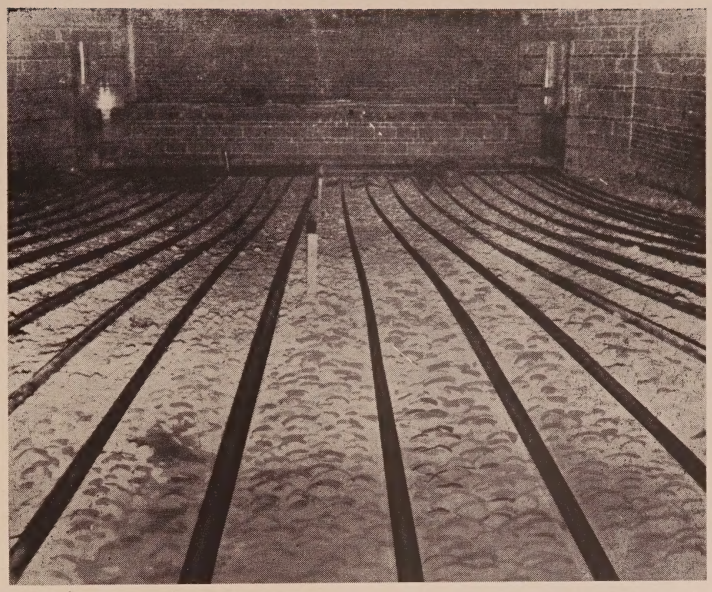
Comparative Costs

Installation costs have steadily declined throughout the years due to engineering and fabrication improvements. In most communities radiant heating systems need not cost any more than any other good heating system.

PRACTICAL CONSIDERATIONS

The primary objective of any heating system is to provide and maintain healthful and comfortable conditions in enclosed structures during cold seasons. This is indeed essential in theatres. A great deal of research has been conducted to determine just what constitutes ideal conditions of comfort.

In most systems, hot water is forced through the pipes and circulated back to the boiler for reheating. Water temperatures in a radiant heating system are much lower than in conventional systems because the latter depend upon small heating surfaces with high temperatures to heat an area while radiant heating involves large surfaces with low temperature. Because lower temperatures are required, there is greater fuel economy. Savings up to 30 per cent may be anticipated in a radiant heating system. There also is the possibility of reducing the size of the boiler due to the lower temperature requisites.



THE INCLINED FLOOR OF A THEATRE AUDITORIUM is no bar to radiant-heating installations, as indicated by this picture of the coil system in the floor of the Jewell Valley Theatre, Jewell Valley, Virginia. Hot water, circulating through the coils from a conventional boiler, warms the concrete floor. Such coils are generally installed on a slight pitch to facilitate gravity drainage of the system when the need for heating is no longer present.

Stratification of Air

One of the major problems in heating a theatre auditorium is the necessity for uniform distribution of heat throughout the entire area. What theatre manager has not heard complaints from patrons seated near radiators or registers that they are uncomfortable because of the excessive heat? And, likewise, complaints from patrons farther away from the heating units that they are too cold?

Naturally, to furnish enough heat for those patrons in the center of the theatre it is necessary to increase the temperature of the heating units. When this is done, the patrons nearest the units become too hot.

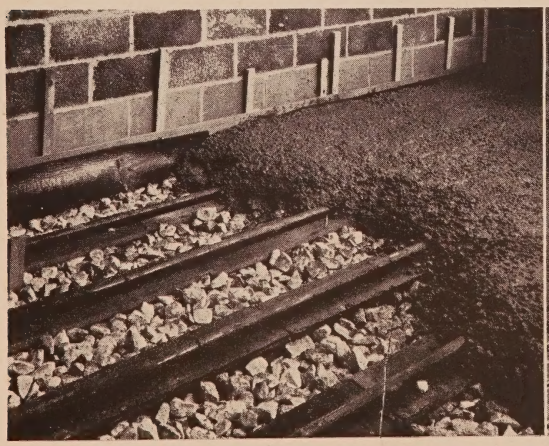
By controlling the temperature of wall, floor, and ceiling surfaces which abstract the normal body heat, it is possible to provide equal comfort for all patrons, regardless of where they may be seated.

Warm air rises to the ceiling and temporarily remains there, losing a certain amount of its heat value to the colder surfaces of the ceiling. Should there be any openings in the ceiling, the warm air will escape. As additional warm air rises, that remaining at ceiling level gradually is forced downward.

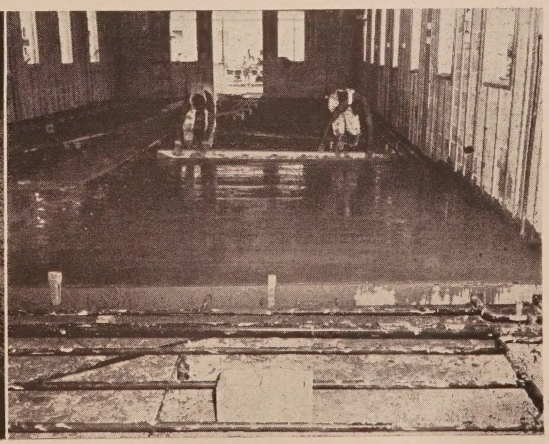
During the descent, a series of layers of air, each at a different temperature, is built up. This results in warm strata of air at some levels and colder strata at others. It is this uneven distribution which causes discomfort—stuffiness at head level and an annoying chill at foot level, or vice versa.

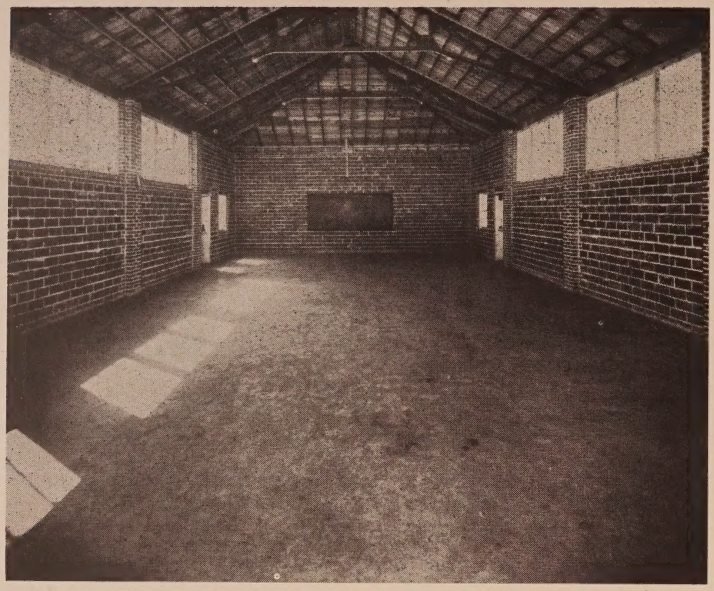
Cold drafts which sweep along the floor of an auditorium also cause uncomfortable conditions. The ideal situation

EMBEDDING THE RADIANT-HEATING SYSTEM GRIDIRON in concrete to form the floor slab is shown in this photograph. Object of this unique heating system is to warm the floor surfaces to a comfortable temperature to compensate for the body's normal heat losses through radiation without causing stuffy atmospheric conditions.



SMOOTHING THE CONCRETE SLAB for flooring over a network of pipes for a radiant heating system is shown here. One of the advantages of this system is that heating facilities can be installed immediately after the foundation, and put into operation to provide comfortable interior working conditions during cold weather.





THIS SCHOOL ROOM clearly indicates how a radiant-heating system eliminated bulky heating elements frequently used in conventional systems. Note that every inch of floor space is available, inasmuch as the heating units are completely embedded in the floor slab and, consequently, out of sight. Radiant heating gives greater warmth with less heat because, by warming walls and floors, it prevents the loss of body heat by radiation.

is where the temperature at floor level is equal to or greater than at head level. This balance is difficult to achieve, especially in high-ceilinged theatre auditoriums.

In a radiantly heated building, the air temperature at different levels varies only slightly and the maximum temperature is at floor level. Scientific observations in a radiant-heated cathedral in England disclosed that when the temperature four feet above floor level was 60 degrees, the temperature 97 feet higher was 58½ degrees, only 1½ degrees lower. The heating elements of a radiant heating system generally are located in the floor and these heat the floor to a desired temperature. From the floor, heat is radiated to all other colder surfaces until they too are approximately the same temperature. Therefore, the air temperature is of little consequence in a radiant heated environment because heat radiations can pass through the air without disturbing it, or inciting currents.

The complex subject of ventilation in a theatre building is extremely important and radiant heating systems are designed so that they will function well with whatever air conditioning units might be installed.

SNUGGLED IN THE COAL-RIBBED HILLS of Buchanan County, Virginia, is Jewell Valley, so small and inaccessible (to city-dwellers) that it rarely appears even as a dot on the map. Yet to the Jewell Valley Theatre — a 350-seat house built to serve the motion-picture requirements of the employes of the Jewell Ridge Coal Corporation — must go the credit of the first theatre in the United States to utilize radiant heating, a system earlier proved efficacious in providing plenty of heat for schools, churches, offices, and homes in coldest weather.

Space Utilization

Maximum utilization of space is another advantage which has made radiant heating so popular, especially in areas designed to house audiences. With all heating elements completely concealed, seating arrangements are not restricted and all floor space is available.

Dust Problem

The prevalence of dust particles in air which is being circulated by erratic currents throughout the auditorium can be a health hazard, because these dust particles sometimes carry disease-producing or disease-carrying organisms. Radiant heating provides a sanitary and healthful atmosphere for theatre-goers, because the volume of air currents in radiant-heated areas is almost negligible and dust particles are permitted to settle out.

Dirt problems have always heckled theatre managements. Periodic cleaning or painting of walls, ceilings, fixtures and draperies represent sizeable figures in a budget. Since dirt tends to collect or precipitate on cold surfaces, walls, fixtures and ceilings having temperatures lower than the air temperature soon become coated with dirt. The principle of radiant heating is to heat the surfaces, not the air, and this is why dirt problems are lessened in radiant-heated areas. Buildings in which radiant heating has been installed have remained clean for more than seven years.

Between-Shows Cooling

In neighborhood show houses having two bills nightly it sometimes becomes a problem when the early audience exits after the first show and the doors are left open for a length of time. Warm air in the auditorium escapes very rapidly and cold air rushes inside, chilling the auditorium. When air is not the primary comfort-producing medium, as in radiant heating, the entry of cold air does not produce any discomfort to patrons if floor and wall surfaces are warm. Tests made in a radiant-heated airplane hangar revealed there was a 22-degree drop in air temperature inside when the huge doors were opened. Normal temperature was regained completely in 6½ minutes after the doors were closed.

Maintenance of Air-Conditioning Equipment

Brief Summary of the Things to Be Done To Keep Machinery in Good Running Order

Approximately ten to twenty per cent of the cost of a building, heated in winter and cooled in summer, is spent on the heating, ventilation, and air-conditioning installation. Yet this expensive item is usually neglected and allowed to deteriorate more rapidly than is necessary if the equipment received proper maintenance.

GENERAL CONSIDERATIONS

Water is one of the most destructive agents. In conjunction with heating and cooling, water is frequently used in the system, and, unless the system is properly designed, constructed, and maintained, the water accelerates the deterioration of those parts of the system with which it comes in contact.

Too, whenever quantities of water are used over continuing periods of time, accumulations of bacteria and algae (green slime) are apt to result. The conditions under which these things come to pass vary with each water source and set of equipment. Accordingly, every operator of air conditioning should make sure that such accumulations are not forming. If they are, he should immediately call in his air-conditioning engineer for advice on overcoming this situation.

The Basic Rules

The following basic rules should serve as a common yardstick, covering the maintenance of all mechanical equipment.

(1) Keep all mechanical equipment clean and free from dirt and foreign matter.

(2) Keep all surfaces clean and painted with paint which will act as a protective coating to the material of which the parts are made.

(3) Lubricate all working parts at regular intervals.

(4) Keep water, dirt, and foreign matter out of and away from all electric motors.

A great deal of this work can be done with common labor, if the theatreman knows how it should be done. It is safe to say that pennies spent on maintenance will save dollars on repairs and replacements.

Before Calling the Serviceman

When calling a serviceman, be sure to call one who knows his business and completely understands how your system was designed to operate. You may avoid some unnecessary trips of the serviceman if you will check the following items before you place a call for him.

If the compressor will not start—

(1) Has the main switch been opened?

(2) Has a fuse blown out?

(3) Is the power off in the theatre?

(4) If a self-contained unit, is it plugged in?

If the motor continues to run—

(1) Is the belt broken or removed from the pulley?

If a water-cooled compressor persistently stops after running a short time—

(1) Has the water supply been turned off?

(2) Are the water lines frozen?

(3) Is there sufficient circulation of air around the compressor?

(4) Is air circulation in the conditioned area blocked?

(5) Is it due to some temporary overload on the equipment, or some other condition which corrects itself?

However, whenever you are in doubt as to the proper operation of your equipment, do not take any chances! Call your serviceman at once!

SPECIFIC CONSIDERATIONS

The following paragraphs discuss in brief salient points in the maintenance of complete air-conditioning equipment. However, included are most of the items comprising other air-cooling and ventilation systems.

Air Filters

Filters consist of mesh-like metal, glass wool, or cloth contained in a framework. The air passes through the material and is cleaned. Filters, in air-conditioning equipment, may be of one of two types. One is a throw-away, readily identified by the cardboard framing and inexpensive construction; the other consists of a metal frame and filtering material. As the filters become dusty, tending to cut down the volume of conditioned air passing through the system, they should be cleaned at regular intervals. Throw-away filters should be replaced regularly.

Air Infiltration

Large quantities of air leak into theatres from outdoors. Leakage occurs around windows and doors, and even through walls which are not tightly built. As all air which is brought in from the outside must be conditioned, the leakage should be kept at a minimum. Keep windows and doors closed, so that leakage from outdoors will be kept as small as possible. Locking windows often helps air-tightness.

Bearings

There are one or more bearings in all units which have fans, motors, compressors, or other moving parts. Use only clean, grit-free lubricant for bearings. Do not use an excessive amount, as too much lubricant is harmful as well as

THE FILTER SECTIONS, shown at the left, are ready to be moved into place and bolted to the coil system. As the filters become dusty, they tend to cut down the volume of air passing through them. When particularly dirty, the filters are no longer capable of performing the function for which they are installed and, indeed, may themselves become the source of dust pumped back into auditorium. In cleaning, follow the manufacturer's rules.

wasteful. Use the type of lubricant recommended by the manufacturer. Instructions provided at the time the equipment was installed also include the information on proper lubrication. Keep bearings clean. Use extra care when greasing ball bearings, to prevent dust or foreign particles from entering. When bearings show unusual wear, or seem in any way to be faulty, call in an expert service engineer.

Belts and Pulleys

Units which have motor-drive fans, compressors, or pumps will also have a belt—either of the flat- or V-belt type of drive—unless the equipment is mounted on the motor shaft or is direct-connected by a coupling. Belts are of a rubber composition and should be given extra care. Due to the rubber shortage, belts may not be replaceable. Discarded belts should be salvaged for the war effort.

Keep all belts free from grease and oil, which cause rapid deterioration of the belt, as well as allowing slipping. Keep them dry and clean, and if water spatters on them, wipe it off thoroughly. Dirty belts can be washed with a mild solution of trisodium phosphate and then wiped dry. If oil, grease, or other harmful substance collect on the belts, remove the material with water or naphtha and dry thoroughly.

Flat-Belt Drives—Keep belts tight enough to prevent slipping. But do not keep them so tight as to cause excessive wear on the bearings. Belts should be loose enough to permit about a half-inch play when pressed with one finger.

If a belt shows excessive wear, fraying, or splitting, it should be replaced at once. Belts stretch, and, unless the compressor has an automatic belt tightener, it will be necessary to tighten the belt adjustment as the belt wears in. If such adjustment has been made, it will be necessary to loosen the adjustment when a new belt is installed. If a compressor uses multiple belts, all the belts should be replaced at the same time. When replacing belts, make an effort to get the same make and model as the one being replaced. When replacing or rotating belts, never pry or force them off the pulley, as this puts a strain on the belt which may break the outer strands. To remove belts, loosen the motor-holding bolts, so that the belts can be easily slipped on and off. When new belts are installed, check them for tightness at the end of the first two or three weeks of operation. Tighten belts by sliding the motor.

V-Belt Drives—The very fact that V-belts require so little care should not be allowed to encourage neglect. It is most important to keep the sidewalls of sheave grooves perfectly straight. Where walls wear out of straight, the gripping power and efficiency of the V-belt will be greatly reduced.

Do not be afraid to pull V-belts tight. Stretching them slightly in adjusting tension is good for them, but check for undue stretch and sag. A slack V-belt feels dead when you thump it with your hand; a properly taut V-belt has an alive springiness. Keep all V-belts on each drive pulling in unison to maintain their united strength. Most of the stretching that will occur during the life of a set of V-belts takes place during the breaking-in period. Nevertheless, drives should receive regular, follow-up inspections for proper tension. When one or two V-belts in a set have become worn or damaged, always install a complete, scientifically matched set.

Pulleys and Shafts—Pulleys must be kept in line with each other, otherwise the belt will wear rapidly. If the belt seems out of line, report it to your maintenance man. If more than two belts are used on pulleys, shift the position of the belts, if one is showing unusual wear. Rotating belts in a set increases the length of service.

When shafts of the driving and driven sheaves are not parallel, V-belts on one side of the set are thus drawn tighter and pull more than their share of the load. Naturally, that part of the set is the first to wear out, robbing the full set of much of its life. While checking the parallelism of the shafts, see that the sheave grooves are in line, too. If out of line, your V-belts are being subjected to needless rubbing on their sides, wearing their covers, and building up harmful heat.

Coils of Various Kinds

Whenever heat is added or removed the equipment has a coil. In many cases, the pipe will have a spiral fin wound around its outer surface. Around some coils, however, the fins are square plates. All types of coils need attention to keep them efficient and make them last.

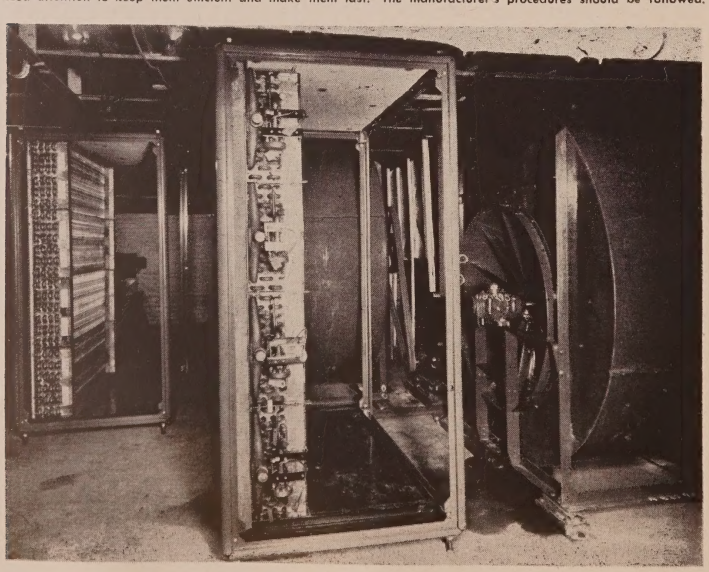
Coils for Cooling—Coils for cooling air are of both fin types. Keep coil and fin surfaces free from dust and lint, so that air may pass over them readily, and the efficiency of the coil may be kept at a maximum. Excessively dirty coils require attention of an expert service engineer. Air-cooling coils will condense moisture from the air, so that, on hot, humid days, water will drip from the coils. Be sure that the drain and drip pan are kept clean so as to allow adequate drainage for the condensate and to eliminate odors which may result from stagnating drippings.

Coils for Heating—Coils for heating, usually of the spiral-fin type and made of copper, may be irreplaceable, and, so, should be protected at all times. The air to be heated is blown over the coils and hot water or steam is circulated inside the coils to do the heating. Keep coil surfaces free from dust, so that heat will be efficiently transferred to the air.

Air-Cooled Coils—When cooling is obtained by passing air over the coils in which is circulated the refrigerant or other material to be cooled, care is the same as given under Coils for Cooling.

Air and Water-Cooled Coils — When cooling is done by air and water, the material is circulated inside of the pipe. The outside of the pipe is sprayed with water. Air blown across the wetted surfaces of the coils evaporates the water. The heat for vaporization is taken from the refrigerant or jacket water that is to be cooled. Coils must be kept in good condition. Because water, when evaporated, may leave scaly deposit, particular attention must be paid to the water spray to prevent the formation of scale on the coils. If scale does form on the surface in large amounts, report it to your maintenance man. Make sure that devices carrying off waste water from sprays are open and operating. Some water must constantly flow into the drain. This spill-over prevents accumulation of dissolved solids in the water.

COOLING COILS are installed adjacent to the fans. Each of the two sections shown here is made up of four direct expansion coils. Whenever heat is added or removed, the equipment has a coil. In many cases, the pipe will have a spiral fin wound around its outer surface; in other cases the fins are square plates. All types of coils need attention to keep them efficient and make them last. The manufacturer's procedures should be followed.



Water-Cooled Coils—When water is used for cooling a refrigerant, coils are not visible, but are contained in a shell, which has the appearance of a long, cylindrical tank, mounted horizontally. If the refrigerant or liquid is not being cooled sufficiently, it may be due to the formation of scale inside the water coils. If inadequate cooling is indicated, call your maintenance man.

Defrosting Coils—A coating of ice or frost on a cooling unit acts as insulation and must be removed. Defrosting is usually accomplished by turning the power switch to the "off" position until the ice is completely melted. Never use an ice pick or any other sharp instrument to hasten defrosting. A stream of cold water will loosen it quickly. Never use hot water for defrosting commercial units. Check drains before defrosting. Be sure pans and baffles are supported properly and have sufficient slant to drain well. Do not place anything on drip pans or baffles, as circulation will be restricted and ice formation may result.

Compressors

The compressor is the heart of the plant, pumping the refrigerant through the system. The compressor should be kept in first-class condition, so that it will do its job of cooling without working overtime.

Belt-Driven Type—If the compressor develops a knocking noise, shut the unit down immediately before any damage can occur, and call the maintenance man at once. If water-cooled compressors are exposed to freezing temperatures, have your serviceman take the necessary precautions to prevent damage to the machine. Draining of a water-cooled compressor must be handled by an experienced man, to insure that all water is removed from the condenser. The suggestion to give your compressor room to breathe applies to both air- and water-cooled compressors. Piling boxes around the compressor causes overheating, and loss of efficiency results and the operating costs go up.

Sealed Type—Due to their design, sealed-type units require a minimum of attention. However, the following points will help to improve refrigeration, reduce operating costs, and prolong the life of the equipment. A thick coating of dust and dirt will hold extra heat in the compressor and reduce its over-all operating efficiency. Such coatings often cause metal surfaces to rust. Do not allow dust and dirt to collect on the condenser. Clean periodically with a brush or vacuum-cleaner attachment. Always disconnect the extension cord, or turn the supply switch to the "off" position before cleaning the condenser. Do not pile boxes or other materials around your compressor. Blocked circulation will reduce efficiency, increase operating costs, and cause needless wear on equipment. If the compressor is installed in the machine compartment of a fixture, do not block the grille openings or allow them to be clogged with dirt. Some air-cooled units have a separate fan motor. Your instruction book, dealer, or serviceman will tell you where and how often to oil it and the type and grade of oil to be used.

Condensers

In one stage of the refrigeration cycle, the refrigerant gas must be changed into a liquid. In order to do this, heat must be removed from the gas. Air may be used for removing the heat. In such cases, the condenser consists of a coil, through which the refrigerant flows, a fan to blow the air over the coil, and a motor to drive the fan. Condensers cooled by water consist of a coil enclosed in a shell similar to the one described under Water-Cooled Coils. Coils cooled by the evaporation of water consist of the coil, a means of wetting the coil surfaces with a water spray, fan to circulate the air, and a motor to drive the fan. Detailed description of this type of coil may be found under Air- and Water-Cooled Coils.

Air-Cooled Condensers—Do not allow dust and dirt to clog up the air passages of an air-cooled condenser. Before cleaning any part of the compressor, be sure to turn the power-supply switch to the "off" position. The condenser should be cleaned frequently with a brush, bicycle pump, or vacuum-cleaner attachment.

Keep coils in good condition by following instructions given under Air-Cooled Coils.

Keep fans in good condition by following instructions given under Motors.

Water-Cooled Condensers—Keep coil in good condition by following the instructions given under Water-Cooled Coils.

Evaporative Condensers—Evaporative condensers are a valuable part of a refrigerating system. It is important to keep them functioning properly in order to effect savings. Evaporative condensers and water towers exposed to freezing temperatures must be properly drained to prevent damage from freezing. The cooling equipment will probably not be operating when freezing weather occurs, and exposure of water-cooled equipment to temperatures even a little below freezing may cause serious damage. Keep condenser in condition by following the instructions given under Air- and Water-Cooled Coils, Fans, Motors, and Spray Nozzles.

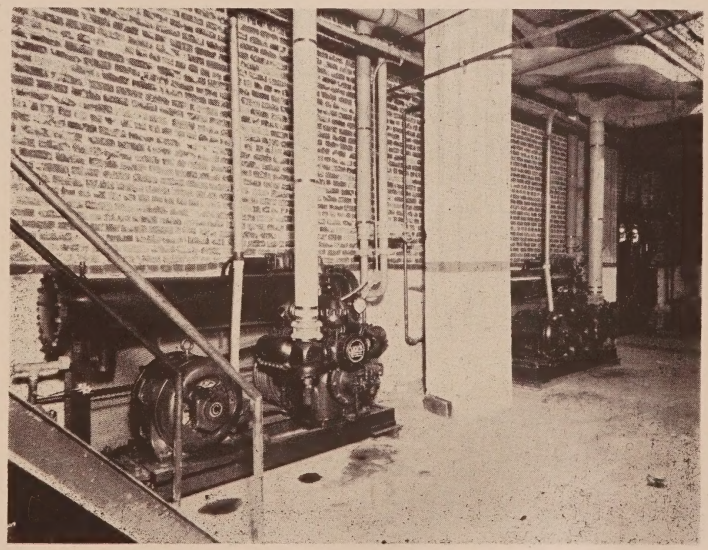
Controls

The controls are the brains of the refrigeration system. Without these efficient devices, automatic operation of the equipment would not be possible. If the controls do not operate properly, they should be adjusted by an experienced serviceman, who knows how your particular system was designed to operate.

Refrigerant Controls—Included in refrigerant controls are the various types which regulate the flow of the refrigerant through the system. These consist of automatic and thermostatic expansion valves, temperature regulating valves, and others. The correct setting of these valves should be handled only by an experienced serviceman.

Electrical Controls—The group of electrical controls includes devices such as your thermostats, circuit breakers, many of which are used to make-and-break the electric current to start and stop the motor. Since dust and insects may cause the current to arc and, thereby, burn contact points, the covers of these controls should be kept tightly in place as a protection against dust and unauthorized tampering. Switches for starting and stopping the equipment and electric devices which control air-conditioning and refrigeration machinery have contact points which may deteriorate. When electric circuits are broken, a spark occurs, and this may cause pitting of

THE COMPRESSORS shown here are two 50-horsepower, 5¼-by-4¼-inch condensing units, installed for theatre use. The compressor is the heart of the plant, pumping the refrigerant through the system. The compressor should be kept in first-class condition, so that it will do its job of cooling without working overtime. Beside the pictured belt-drive type, there is a sealed-type of compressor. Always follow the makers suggestions in maintenance.



the terminal. Excess sparking is an indication that the contacts should be cleaned. Oftentimes the pitted surfaces and dust are not visible. Clean with care, by using a fine sandpaper on the two terminals which form the contact.

Couplings and Unions

When fan, compressor, or pumps are not belt-driven, nor the fan mounted on the motor shaft, couplings are used to connect the motor drive to the rotating part. The coupling may be identified as the disc-like part located between the motor shaft and fan, compressor, or pump shaft. These disc-like parts are bolted together so that the two shafts will operate as a unit.

Unions are metal-to-metal seat unions with conical or spherical joints, having at least one face made from brass. In addition to the ordinary pattern, they may be made in special forms, such as elbows, tees, and so forth. They are designed for use where the working pressures do not exceed 50 pounds to the square inch.

Check line-up of couplings and unions at least once a year, according to the owner's operating instructions. Where a coupling seems out of line, that is, the shafts do not continue as one piece, consult your maintenance man.

Dampers

Dampers are used for regulating the amount of air in the system. They are automatically or manually operated. Bearings and linkages, connecting the damper levers to controls, should be kept oiled so that they will move freely. Automatically operated dampers should be checked for easy operation. Dampers should not be allowed to rust, and should be painted often to prevent such deterioration.

Ducts and Duct Systems

Ducts compose the air distributing system, when air-conditiioning equipment is located remotely from the room being conditioned. Two precautions should be taken in servicing ducts: one is guarding against the collecting of dust and lint and the other the prevention of opening up joints, permitting large quantities of conditioned air to escape. Check all ducts for opened joints and tighten wherever possible. Ducts should be cleaned out at intervals, so that dust and lint will not accumulate and restrict the flow of air within. Cleaning of ducts is also a precaution against fire. To prevent ducts from rusting, refer to Metals for the care of sheet metal.

Fans and Blowers

Fans, included in all air-conditioning systems, may be either the propellor or the multiblade, centrifugal type. Sources of noise in fan system, include (1) improper balance of the moving parts, (2) excessive speeds of fans not properly selected, (3) pulsations due to fans too large for the system, (4) high-frequency hum from electric motors, (5) air noises from imperfectly designed or insulated ducts, and (6) lack of insulation. These faults should be corrected.

Fans, like all moving parts, require periodic attention to keep the maintenance low and to insure long life of the fan. To care for fans, follow the instructions given under Bearings, Belts, and Metals. With fans of the propellor type, clean the blades when they are accessible without removing parts of the unit. Centrifugal fans do not have easily accessible blades, so require a trained service engineer for a cleaning job. To avoid excess wear, fan and fan motor bearings should be lubricated regularly, using the oil or grease recommended by the manufacturer.

Flywheels

In most air-conditioning, refrigeration, and heating systems, the pulley for runing the equipment (not the motor pulley) is built to serve as a flywheel. Therefore, in most instances, checking on the pulley means checking on the flywheel. Keep flywheel running true. A wobbly flywheel, or pulley, causes unnecessary shaft and belt wear and excessive vibration. If the wheel becomes wobbly, call your maintenance man. Keep the screw tight, so that the flywheel, or pulley, is held in place.

Fuses

Fuses and motor-overload protectors must be of the right size and type to protect motors against overheating and possible burn-out. If the fuses are oversize, they will not protect the motor; if undersize, they may blow and stop the motor needlessly. Fuses should not be of the delayed-action type. It always pays to have these devices checked by your serviceman or electrician. All motor fuses should be of the proper size, as specified by the underwriters. Also, fuses should be tested for tightness, contacts, and cleanliness of contact surfaces. The links in the fuses should be replaced about every one or two years, as it is not always wise to wait for a fuse to blow before replacing the links.

Gauges

Various gauges are put on air-conditioning and refrigeration equipment to show how the equipment is operating. They are of value only when they are recording properly. Mark on the gauge the place the indicating needle should be when the equipment is operating correctly, according to the instructions supplied at the time of installation. When the gauges are not operating, call your maintenance man.

Grilles and Air Outlets

Stopped-up grilles, air outlets, and louvers cut down the flow of air and lessen the efficiency of the entire system. When cleaning this equipment, be careful not to change the adjustment of the outlets or dampers.

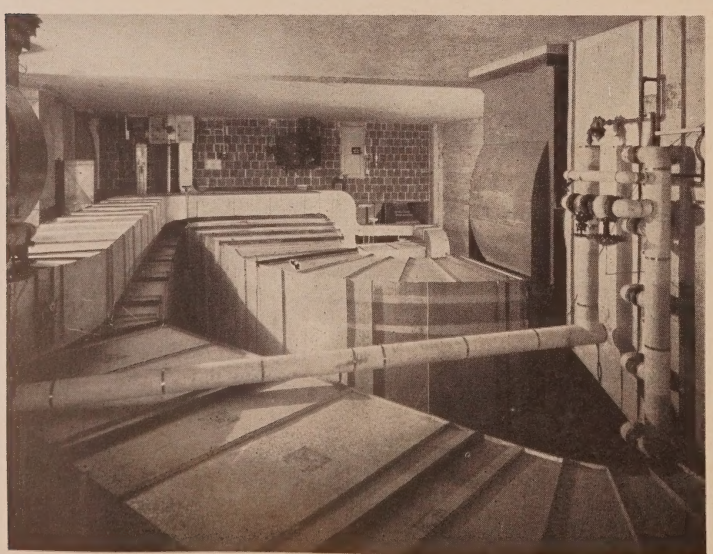
Leaks

Leaks in air-conditioning, refrigeration, and heating equipment mean waste. To save, prevent these leaks when possible by proper care, and repair all leaks promptly. Leaks in water lines are detected by drips, those in steam lines by presence of moisture. Usually leaks can be repaired by an unskilled, but instructed mechanic.

Metals

A large amount of metal is used in air-conditioning, refrigeration, heating, and ventilation equipment, so its protection is an important part of maintenance.

THE DUCT SYSTEM of an air-conditioning installation must be kept free from dust and lint which not only prevents the proper operation of dampers and vents but also forms a fire-hazard. Shown here is part of the duct system installed in a large California theatre. Besides maintaining the ducts free from matter which might cause clogging, it is also necessary to maintain exterior surfaces for the prevention of rust. Follow the instructions.



If metals show rust spots, act promptly, as rust is an index of deterioration. Clean the metal casing of your air-conditioning unit, inside and out, at least once a year. Clean all rust spots with a wire brush or steel wool. To prevent further rusting, apply a rust arrestive, and then paint the metal surfaces with a water-resistant, rust-resisting paint.

Motors

Equipment, which has a fan for circulating conditioned air, a compressor supplying the refrigeration, and a water pump, includes a motor for driving the unit. The motor should be kept in good condition, if power costs are to be kept at a minimum. To start and stop motors, follow operating instructions supplied at the time installation of the equipment was made. Dirt and misplaced oil are poison to insulation, wiring, and commutator. Before cleaning a motor, always shut off the current. Clean motor surfaces frequently with a dry cloth. Never use water or cleaning fluids. Internal parts should be cleaned by an electrician or serviceman. Motors require periodic oiling. Your instruction book, dealer, or serviceman will tell you what kind of oil to use, where to use it, and how often.

Direct-Current Motors—On all direct-current motors, be certain that brush pressures are correct on the commutator, and that the brushes work freely in their holders. The commutator itself and the slots between segments should be kept free and clean of grease and dirt. The surface of the commutator should be cleaned off with a canvas cloth. Carbon tetrachloride may also be used, if available, to clean the commutator.

The interior of the motor housing should be blown out frequently, preferably with an electric blower, to remove dust. Accumulations of oil, grease, or other foreign matter around the base should be cleaned off. All insulated motor leads need to be cleaned of any grease. When the housing or framework is uncomfortable to the touch, it is a sure sign that the motor is laboring with an overload. If the commutator is known to be clean, the brushes have the correct tension, and the like, and if the motor is still arcing, it is then time to call in an expert.

A commutator, which is so worn that its surface is untrue and is pitted, will often cause considerable arcing. If this condition exists, it would be advisable to call in a competent concern to remove the armature and have it expertly repaired.

The proper grade of oil or grease should be selected for each type of motor, recommended by your lubricant manufacturer or oil company. At least once a year, all lubricating oil should be drained from bearings and the oil wells and the bearings flushed out with gasoline, to remove all injurious sediment. Make certain that the oil wells have been blown out to remove all traces of gasoline before putting in fresh lubricant.

All worn gear cases could be likewise treated. All bearings which are packed with grease, except where they are permanently sealed, should be likewise treated.

On sealed-sleeve type of bearings, there is usually a felt washer placed in such a manner as to prevent oil from running out along the shaft. When this becomes saturated and deteriorated, have your service man replace it.

Alternating-Current Motors—Some alternating-current motors have commutators and some do not; some have clip rings and different types of brushes. However, the maintenance problem is the same as for direct-current motors. If a three-phase motor fails to come up to speed, and you have trouble in starting, check the fuses in each phase, as sometimes a fuse will blow in one phase and the other will operate. If motors need removing for repairs, do not clip the wires. Unsolder them, as cut leads may increase the repair cost. When a motor has rubber mountings to lessen vibration, these mountings must be kept clean. Oil weakens and destroys rubber and, due to the scarcity of rubber, extra precaution to preserve it should be taken.

Refrigerant

Refrigerants are necessary to the mechanical cooling system. Take care of the refrigerant charge you have, by preventing leaks and having leaks repaired promptly when they do occur. If the presence of oil around fittings or gaskets, or any change in the general operation of the machine indicates a possible leakage of the refrigerant, be sure to call your serviceman to avoid losing the entire charge. When non-condensable gases are present in a refrigerant system, it will operate at higher pressures than it would if these gases were not present. Unnecessarily high pressures result in the compressor being subject to higher bearing loads, higher discharge temperatures, increased wear on moving parts, and greater power consumption. Such non-condensable gases should be purged from the system.

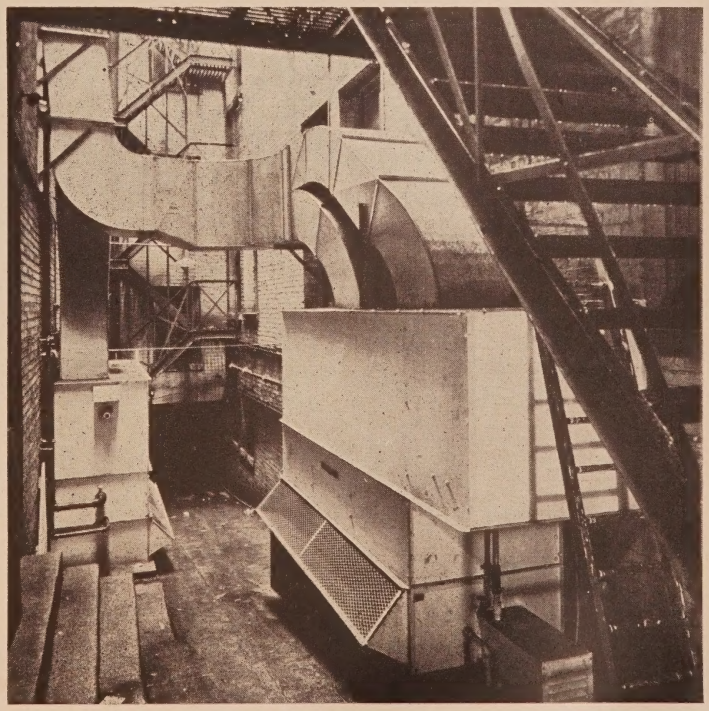
Screens for Air Intakes

The interior of air-conditioning units, evaporative condensers, and similar equipment is protected by screens placed over the air intakes. These protective screens should be free from papers and other refuse, so that air can enter without interference. Do not block the air intakes with furniture, boxes, or the like.

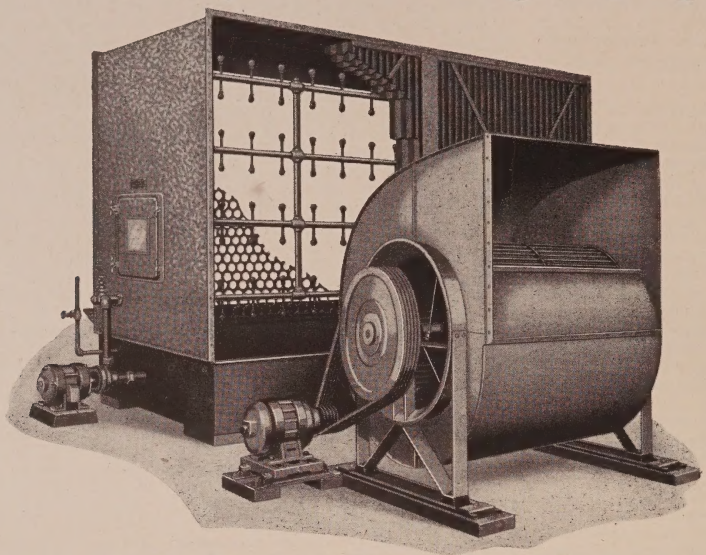
Spray Nozzles

Spray nozzles are used in humidifiers, dehumidifiers, and evaporative condensers. For efficient operation, the spray nozzle must be serviced at regular intervals. Clean each spray nozzle, so that the spray is uniform throughout for the maximum efficiency. Keep water clean, so that dirt is not present to cause wear and corrosion in nozzles. Inspect nozzles periodically for cleaning frequency, and set up a cleaning schedule to suit the locality. A nozzle needs cleaning when its flow of water is irregular or depleted.

EVAPORATIVE CONDENSERS are installed (as shown here) to conserve water used by air-conditioning systems. Use of this equipment will, when properly maintained, pay for itself in a short time through the savings in water costs. Besides maintaining this equipment with the same care given all water-using apparatus, care must be taken that evaporative condensers — and water towers, too — are not exposed to the dangers of freezing.



National Comfort Cooling Equipment



SELECTION CHART

FAN—CLASS I THEATRE AIR WASHER—SPRAY PUMP AND MOTOR COMBINATIONS

SYSTEM	FAN DATA							AIR WASHER DATA			SPRAY SYSTEM AND PUMP DATA									
						Motor					For Lowering the Dry Bulb Temperature of the Entering Air 60% of the (†) Wet Bulb Depression.					For Lowering the Dry Bulb Temperature of the Entering Air 70% of the (†) Wet Bulb Depression.				
C.F.M.	Fan Size	O.V.	* R.P.	RPM	BHP	HP	RPM	Size Washer Class I	Number of Nozzles	Free Area Sq. Ft.	G.P.M.	Head in Feet	Size Pump	Pump RPM	Pump Motor	G.P.M.	Head in Feet	Pump Size	Pump RPM	Pump Motor
11000	100	2000	.44	348	1.93	3	1750	101	60	35.75	60	40	1½x1½	1740	1½	70	45	1½x1½	1740	1½
17000	101	2000	.62	309	3.56	5	1750	101	60	35.75	65	45	1½x1½	1740	1½	75	55	1½x1½	1740	1½
20000	105	1370	.75	235	4.02	5	1150	101	60	35.75	70	50	1½x1½	1740	2	84	65	2x2	1740	2
25000	105	1715	.51	209	4.20	5	1150	105 A or B	96	62.4	96	40	2x2	1740	2	112	45	2x2	1740	3
30000	105	2050	.62	234	6.60	7½	1150	105 A or B	96	62.4	104	45	2x2	1740	2	130	60	2x2	1740	3
35000	108	1600	.76	195	7.20	7½	1150	105 A or B	96	62.4	110	50	2x2	1740	3	138	70	2½x2	1740	5
40000	108	1830	.55	178	7.40	7½	1150	108	144	93.5	150	45	2x2	1740	3	175	60	2½x2	1740	5
45000	108	2060	.62	194	9.82	10	1150	108	144	93.5	162	50	2x2	1740	3	202	70	3x2½	1740	7½
50000	108	2290	.71	211	12.82	15	1150	108	144	93.5	175	60	2½x2	1740	5	223	80	3x2½	1740	7½

From P. 2—Bulletin A23029. Supplement to P. 16—Bulletin A22029.

C.F.M.—Cubic feet of air per minute.

O.V.—Outlet velocity at fan discharge in feet per minute.

(*) R.P.—Resistance pressure in inches of water gauge. (Includes ¼ inch water gauge over requirements for overcoming duct and other resistance.)

R.P.M.—Revolutions per minute.

B.H.P.—Brake horsepower.

G.P.M.—Gallons of water per minute.

Head in Feet—Pressure against which pump operates when handling the required capacity of water.

(†) **Wet Bulb Depression**—is the difference in degrees (F.) between the dry bulb temperature and the wet bulb temperature of the air. In most localities, it is desirable to select the pump and motor for lowering the dry bulb temperature of the entering air 60% of the wet bulb depression, to provide the most comfortable conditions in the theatre without over-humidification.

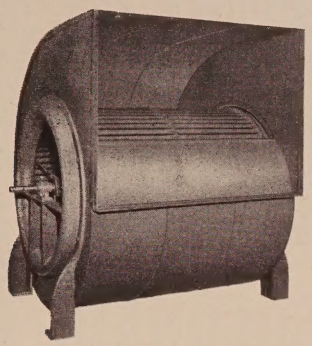
In climates such as encountered at Denver, Colorado, where the humidity is ordinarily low, the pump and motor can be advantageously selected for lowering the temperature of the entering air 70% of the wet bulb depression.

Write for Forms 1129-22-23-24 for Complete Details.

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

National Fans and Air Washers



THEATRE FANS

1. Designed and built especially for theatres by the world's foremost manufacturer of cooling, heating, ventilating, conditioning and allied equipment.

2. Ratings are certified and are in accordance with the standard test code for centrifugal and propeller fans adopted jointly by the N.A.F.M. and A.S.H. & V.E.

3. Operates at a lower speed for a given capacity than any other type of fan.

4. For a given speed it delivers more air per revolution than any other type fan.

5. It is economical in power consumption, quiet in operation, smooth in performance, durable, and occupies a minimum amount of space.

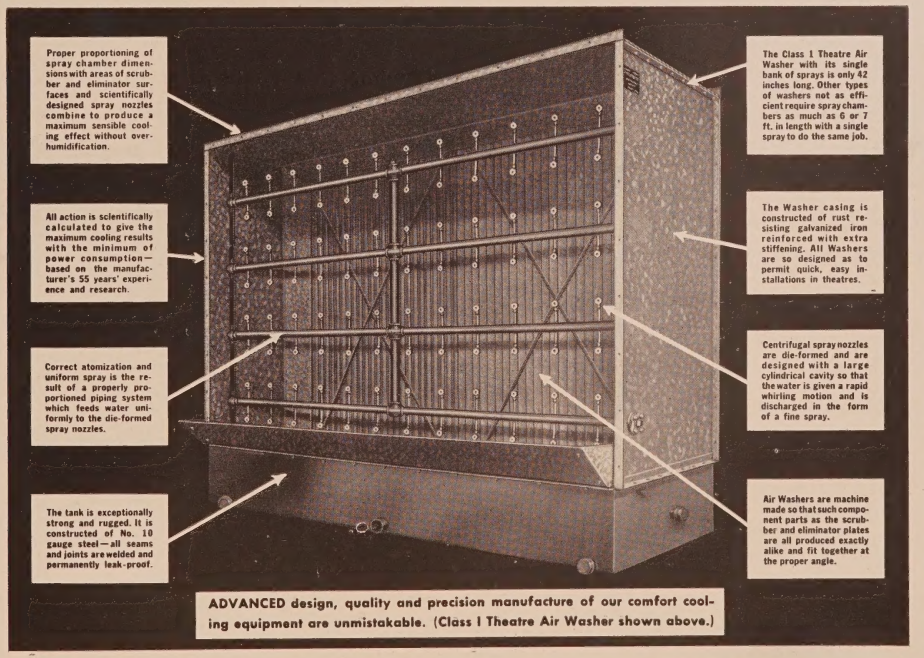
6. THE NATIONAL THEATRE SUPPLY FAN is rugged and strong but light in over-all weight.

THREE WAYS TO COMFORT

1 AIR IN MOTION—For the refreshing, cooling effect of an ample, circulating supply of fresh, outdoor air, NATIONAL THEATRE SUPPLY FANS are the first step in comfort cooling. They are designed and built especially for theatres . . . smooth and quiet in performance, durable, compact, and capable of moving tremendous quantities of air, year in and year out.

2 WASHED AIR—NATIONAL THEATRE SUPPLY CLASS I AIR WASHERS cleanse, purify and freshen the air, remove bacteria-laden dust and water-soluble odors, and have a remarkable cooling effect (by evaporative cooling). Air is brought into intimate contact with water, then sweeps through the theatre like the fresh breeze that follows a rain. Additional cooling effect is provided when cold "well water" is used. (See cooling by "chilled" air, below.)

3 "CHILLED" AIR—NATIONAL THEATRE SUPPLY CLASS II AIR WASHERS (Dehumidifiers) give remarkable Comfort-Cooling effect when "well water" 55° F. or colder is available. Utilizes the cooling effect of the cold "well water," and also washes water-soluble dust and odors from the air. Used with your present or new National Theatre Supply Fan, the Class II Washer provides tremendous quantities of clean, moving, "chilled," nature conditioned air. If you have "cold water" in limited quantities, it can be used in combination with recirculated city water, either with the Class II Washer or Class I Washer.



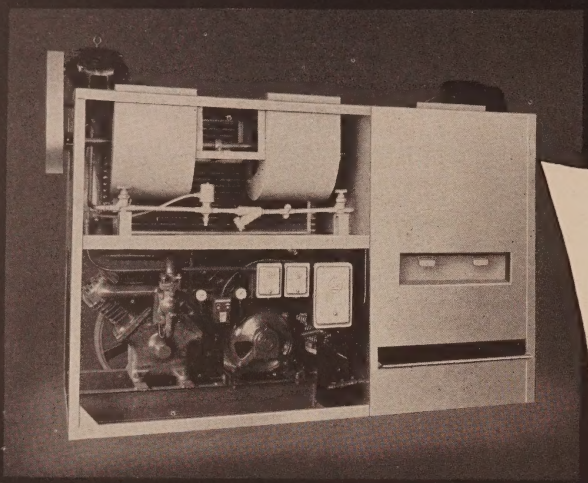
ADVANCED design, quality and precision manufacture of our comfort cooling equipment are unmistakable. (Class I Theatre Air Washer shown above.)

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

Better AIR CONDITIONING for YOUR THEATRE

at Lower Cost



Self-contained Units

GOVERNAIR
Air Conditioning Systems

• High on the list of items which are going to spell better theatre patronage for you in the years just ahead is . . . **BETTER AIR CONDITIONING . . . WHICH CAN BE PURCHASED . . . INSTALLED . . . OPERATED . . . AND MAINTAINED . . . AT LOWER COST!** That is why leading Exhibitors the country over have their eye on **GOVERNAIR AIR CONDITIONING SYSTEMS** . . . years ahead in design and performance . . . especially engineered for theatre use.

Here's what Governair Air Conditioning Systems offer you:—

1. **Complete, self-contained unit assemblies for greater operating efficiency.**
2. **Cools . . . Dehumidifies . . . Cleans . . . and distributes air.**
3. **Easier to install . . . all internal wiring and piping incorporated in unit.**
4. **Economical to operate . . . it saves you money.**
5. **Easier to maintain . . . single unit and easy accessibility to parts simplifies servicing.**
6. **Compact . . . simplified design takes minimum space.**

GOVERNAIR Self-contained Units are available in a wide range of sizes, enabling you to secure a system that is tailor-made to suit every special theatre requirement.

Manufactured by the pioneers of completely self-contained air conditioning units

GOVERNAIR CORPORATION

Distributed by

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

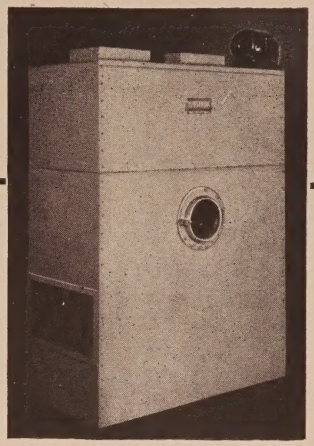
AIR CONDITIONING EQUIPMENT

TYPHOON Cooling and Heating Equipment is the result of painstaking research in theatre air conditioning. More than 30 years of pioneering and close collaboration with theatre engineers and owners have enabled TYPHOON to present air conditioning equipment that will insure perfect performance no matter what type of system is used.

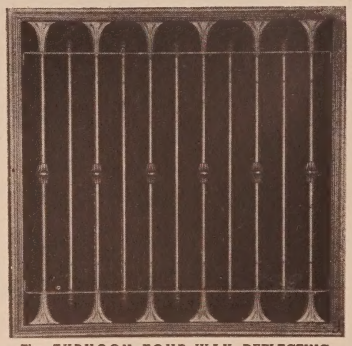
Consult Typhoon Engineers on all matters pertaining to air conditioning.

TYPHOON EQUIPMENT WILL INSURE PERFECT PERFORMANCE WITH ALL TYPES OF AIR CONDITIONING SYSTEMS

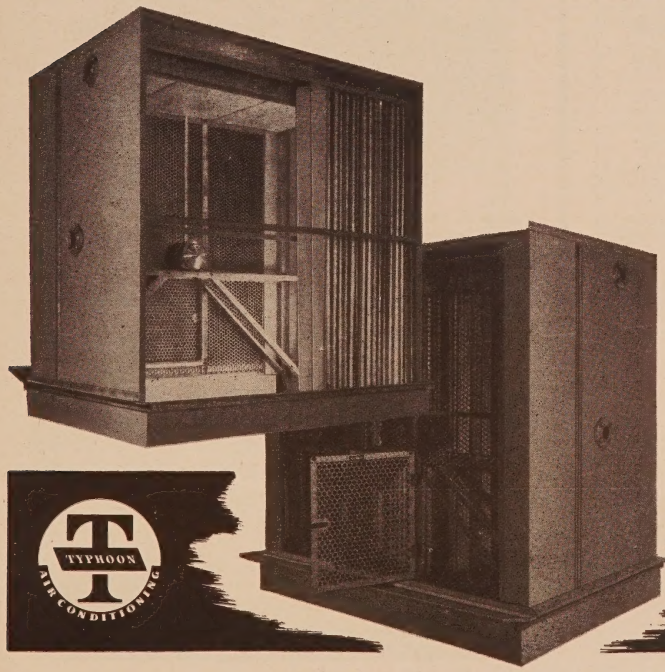
- TYPHOON FANS
- TYPHOON BLOWERS
- PROP-R-TEMP SELF CONTAINED UNITS (3 and 5 Ton)
- TYPHOON EVAPORATIVE CONDENSERS
- TYPHOON SPRAY COOLERS (AIR WASHERS)
- MONSOON HEATING COILS (2 HEADER AND NON-FREEZE)
- MONSOON DIRECT EXPANSION COILS
- MONSOON WATER COILS (CONTINUOUS TUBE AND FREE DRAIN TYPES)



TYPHOON EVAPORATIVE CONDENSER —A compact self-contained unit, ranging in size from 5 to 150 tons, designed to keep air pressure and power requirements to a minimum under toughest conditions of temperature and humidity. The TYPHOON EVAPORATIVE CONDENSER avoids the necessity for consuming large quantities of water.



The TYPHOON FOUR-WAY DEFLECTING GRILLE insures even distribution of air since the horizontal and vertical deflectors are individually adjustable.



• TYPHOON AIR WASHER—The TYPHOON AIR WASHER completely eliminates the use of pressure type nozzles and the difficulties that accompany their use. Instead of atomizing water by forcing it under high pressure through the small orifice of the pressure type nozzles which tend to clog, the TYPHOON AIR WASHER uses high speed rotary atomizers which break up the water into a fine cloud-like mist.

The TYPHOON ATOMIZER completely covers an area that would ordinarily require from 40 to 60 pressure type nozzles. The one nozzle required is so large that it is almost impossible for it to become clogged. The small orifice in the pressure type nozzles, on the other hand, continually give trouble on this score, resulting in incomplete coverage of the spray chamber. TYPHOON AIR WASHERS always work at 100% efficiency. The motor of the rotary atomizer is completely water-proof. These features make the TYPHOON AIR WASHER extraordinarily efficient.

TYPHOON AIR CONDITIONING

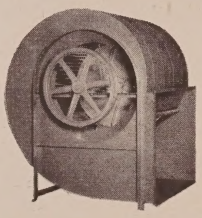
Typhoon Air Conditioning Co., Inc.

252 West 26th Street • New York, N. Y.

BETTER AIR CONDITIONING

WITH USAIRCO MODERN THEATRE COOLING EQUIPMENT

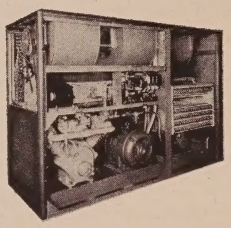
● For 20 years USAIRCO has served the American theatre, large houses and small ones, furnishing the finest in air conditioning systems. Today, as in the past, USAIRCO policy is to engineer and manufacture comfort cooling that will make a profit for the exhibitor. We invite inquiries for your requirements.



Blowers

FANS-EXHAUSTERS

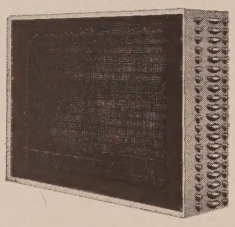
USAIRCO manufactures a complete line of blowers, fans and exhausters for theatre ventilation, cooling and heating applications. These job-rated units are designed for long-life, a minimum of service. Sizes available to fit any application. Centrifugal and propeller types.



Refrigerated

KOOLER-AIRE

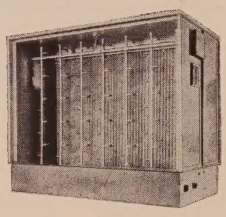
All-in-one-packaged air conditioning unit using mechanical refrigeration. Proper cooling, filtering, dehumidifying and circulation of air. The finest theatre air conditioning is yours with Refrigerated Kooler-Aire. Available in 5 to 25-ton capacities; single or multiple installations.



Cold-Water

KOOLER-AIRE

Designed for comfort cooling where 55° or colder water is available. Low operating cost; maximum cooling for the theatre. Cold-Water Kooler-Aire also dehumidifies as it cools. High pressure type coil, trouble-free design. Deflecto grilles for correct air distribution.



Evaporative

KOOLER-AIRE

The best theatre cooling at the lowest cost. Evaporative Kooler-Aire provides 100% fresh air, properly cooled, washed, cleaned and filtered. Correctly engineered, Kooler-Aire systems are quiet in operation, low in operation cost—quickly paid for in box office take. Deflecto grilles for complete control of air distribution.

Year 'Round

CONDITIONING SYSTEMS

Specially engineered systems designed to cool in the summer, heat in the winter; supplying all-season fresh air ventilation. Available for use with hot water or steam systems. USAIRCO unit heaters are also available for all types of theatre heating. Sizes and capacities to meet your needs.

Pioneers and specialists in theatre cooling for two decades, USAIRCO engineers bring you the best experience and thorough knowledge in creating comfort for theatre audiences. Whether you buy an individual USAIRCO blower or washer—or a complete USAIRCO system—you get all the benefits of USAIRCO specialized engineering.

USAIRCO *Theatre* AIR CONDITIONING

UNITED STATES AIR CONDITIONING CORPORATION

NORTHWESTERN TERMINAL • MINNEAPOLIS, MINN.

PROFITS IN COOLING FOR THE EXHIBITOR

Remember

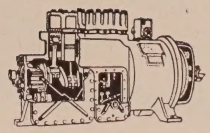
WESTINGHOUSE

FOR

CORRECT

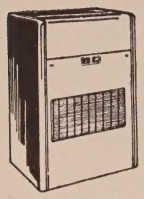
AIR

CONDITIONING



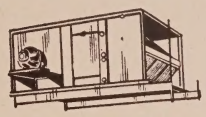
WESTINGHOUSE COMPRESSORS

—the heart of thousands of air conditioning systems—give years of efficient, trouble-free service, thanks to hermetically sealed mechanism, refrigerant cooled direct-drive motor and elimination of seals.



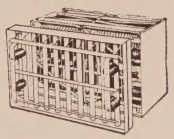
WESTINGHOUSE UNITAIRE

—widely used in stores, restaurants, offices. These compact, attractive, factory-built air conditioners permit easy installation and control, to meet varying requirements.



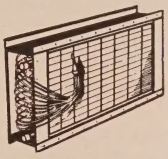
WESTINGHOUSE AIRHANDLING UNITS

—for year-round air conditioning systems and for delivering cooled air to food storage rooms, fur storage vaults, etc. Carefully engineered to save installation time and operating costs.



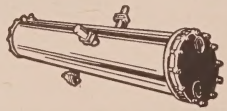
WESTINGHOUSE PRECIPITRON

—used in variety, clothing and other stores where *complete* air cleanliness pays big dividends in reduced spoilage, cleaning and decorating costs.



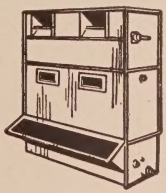
WESTINGHOUSE HEAT TRANSFER SURFACE

—fin-tube coils in a variety of types and sizes for direct expansion refrigerant, steam, hot and cold water. Equipment *matched* to every design requirement.



WESTINGHOUSE WATER COOLED CONDENSER

—used in conjunction with a refrigerant compressor for maximum efficiency and economy where an adequate water supply is available.



WESTINGHOUSE AQUAMISER

—used where water is expensive or its use is restricted, this unit condenses the refrigerant by evaporative means, saves as much as 95% in water used.

WESTINGHOUSE WATER CHILLING UNITS

—permit flexible control of cooling coils in indirect air conditioning systems, and wherever a dependable supply of chilled water is required.

Address your nearest Sturtevant or Westinghouse office or write:

B. F. Sturtevant Company, division of

WESTINGHOUSE ELECTRIC, Hyde Park, Boston 36, Mass.

Is YOUR Theatre Air-Conditioning . . . A FAILURE . . .

A theatre installs air-conditioning, heating or ventilating systems for patron comfort . . . and to *build box-office!*

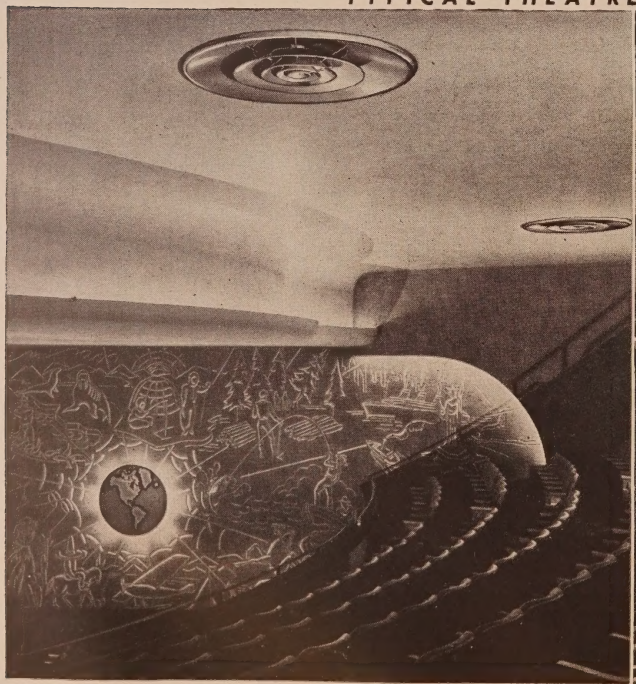
The first requirement is to provide patrons with atmospheric conditions that are conducive to human health and comfort. If theatre patrons feel drafts . . . if there are pockets of dead, stale air . . . if the air is clammy or sticky . . . if it is too warm in some portions and too cool in others . . . if any or all of these undesirable conditions exist — then obviously, "The System Is A Failure" — and *box-office suffers!*

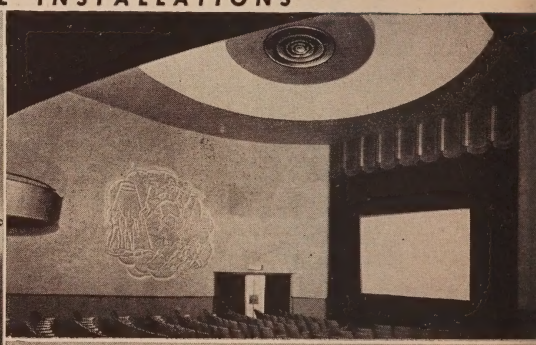
If, on the other hand, draftless, comfortable, healthful atmospheric conditions are constantly maintained, "The System Is A Success" — and *that builds box-office!*

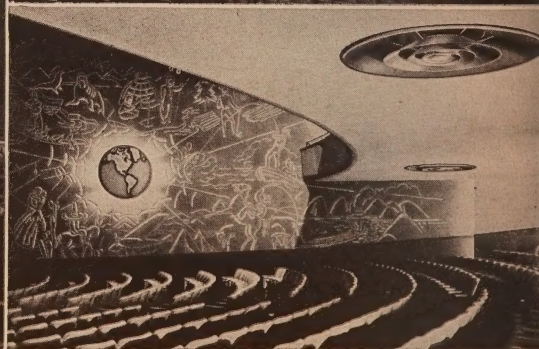
You can be certain of such results through CORRECT AIR-DISTRIBUTION. See to it that every air-supply outlet in your theatre is equipped with

ANEMOSTAT . . .
The Draftless Air-diffuser

TYPICAL THEATRE INSTALLATIONS







or a SUCCESS?

WHAT ANEMOSTATS DO

WHY ANEMOSTATS CANNOT FAIL

HOW ANEMOSTATS REDUCE COST

ANEMOSTATS diffuse conditioned air in such a way that drafts are positively eliminated. They maintain uniform temperatures in every part of your theatre. There are no hot or cold spots, no pools of stale air. Because of the even temperatures, uniform humidity is likewise maintained — hence, no uncomfortable, clammy or sticky spots.

Their design is based solely on the scientific laws governing air in motion. Furthermore, they have no moving parts and nothing can get out of order — they go right on performing indefinitely. They require no attention, no maintenance expense, no replacement.

The cost of equipping a theatre with ANEMOSTATS is only a small fraction of the substantial investment required to install air-conditioning, heating, or ventilating systems . . . but ANEMOSTATS protect systems from failure due to improper air-distribution. Furthermore, in many cases of new installations the use of ANEMOSTATS makes possible substantial savings by permitting smaller air-ducts to be used. There are other important economies we can tell you about.

Write today for bulletin

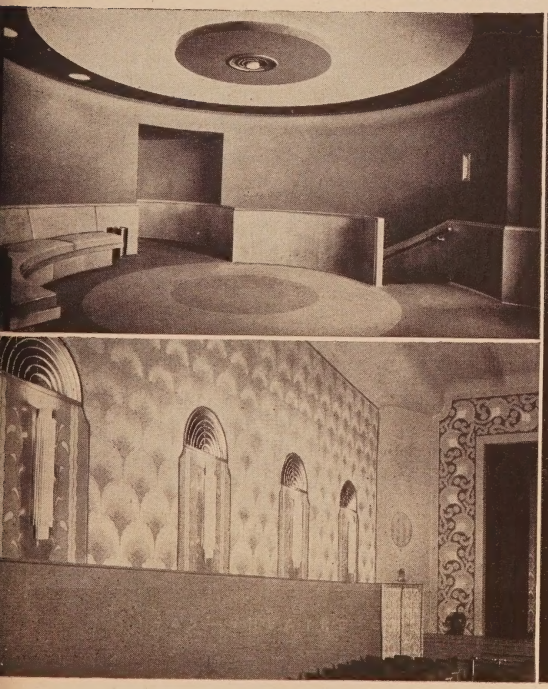
The performance of the ANEMOSTAT is unique — it has no equal! And ANEMOSTATS can be easily applied to either new or existing systems. We are pleased to place our specialized knowledge at the disposal of your architect or engineer.

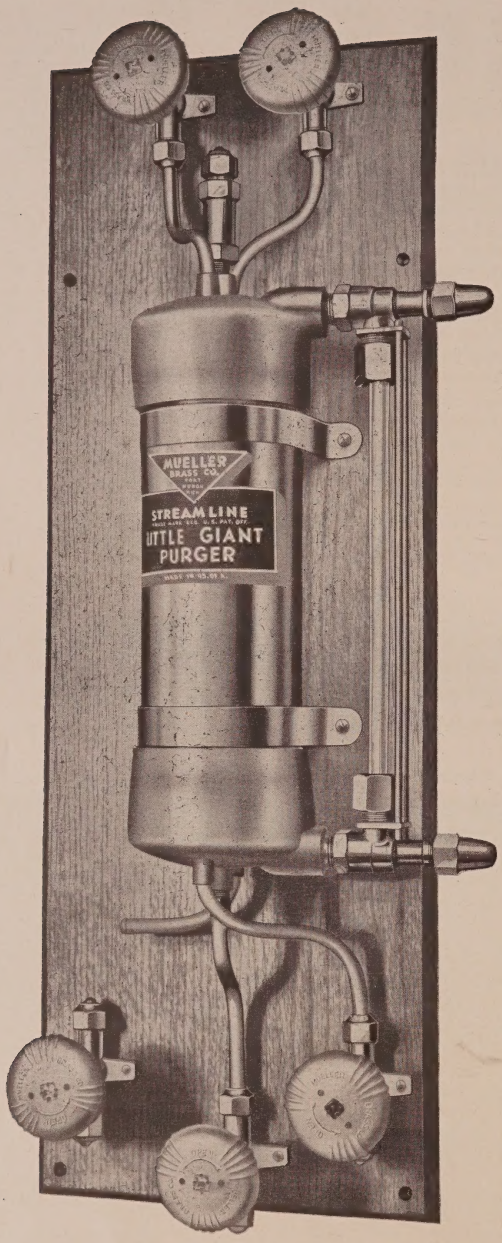
ANEMOSTAT

ANEMOSTAT CORPORATION OF AMERICA
10 EAST 39th STREET NEW YORK 16, N. Y.

"NO AIR-CONDITIONING SYSTEM IS BETTER THAN ITS AIR-DISTRIBUTION"

AC-1040





REDUCE YOUR OPERATING COSTS WITH THE "LITTLE GIANT" PURGER

The "Little Giant" Purger is an essential item and a profitable investment that quickly pays for itself because:

It reduces power costs
It saves expensive refrigerant
It reduces wear and tear on equipment

When non-condensable gases are present in a refrigerant system, it will operate at higher pressures than it would if these gases were not present. Unnecessarily high pressures result in the compressor being subject to:

Higher bearing loads
Higher discharging temperatures
Increased wear on moving parts
Greater power consumption

It is particularly important that the refrigeration system be purged after a shut-down period of any considerable time. The usual practice is to pump the refrigerant back into the receiver and lock it in by means of valves. Repairs or alterations are made on the system during this time, and it is practically impossible to evacuate the system completely, with the result that the remaining air will cause excessive head pressures.

HERE ARE THE ADVANTAGES OF PURGING WITH THE "LITTLE GIANT" PURGER:

THERE IS NO GUESSING—There is positive indication when purging is necessary. The sight glass gives visible evidence of non-condensable gases in the system.

NO REFRIGERANT LOSS—The air in the system is completely separated from the refrigerant before the purge valve is opened.

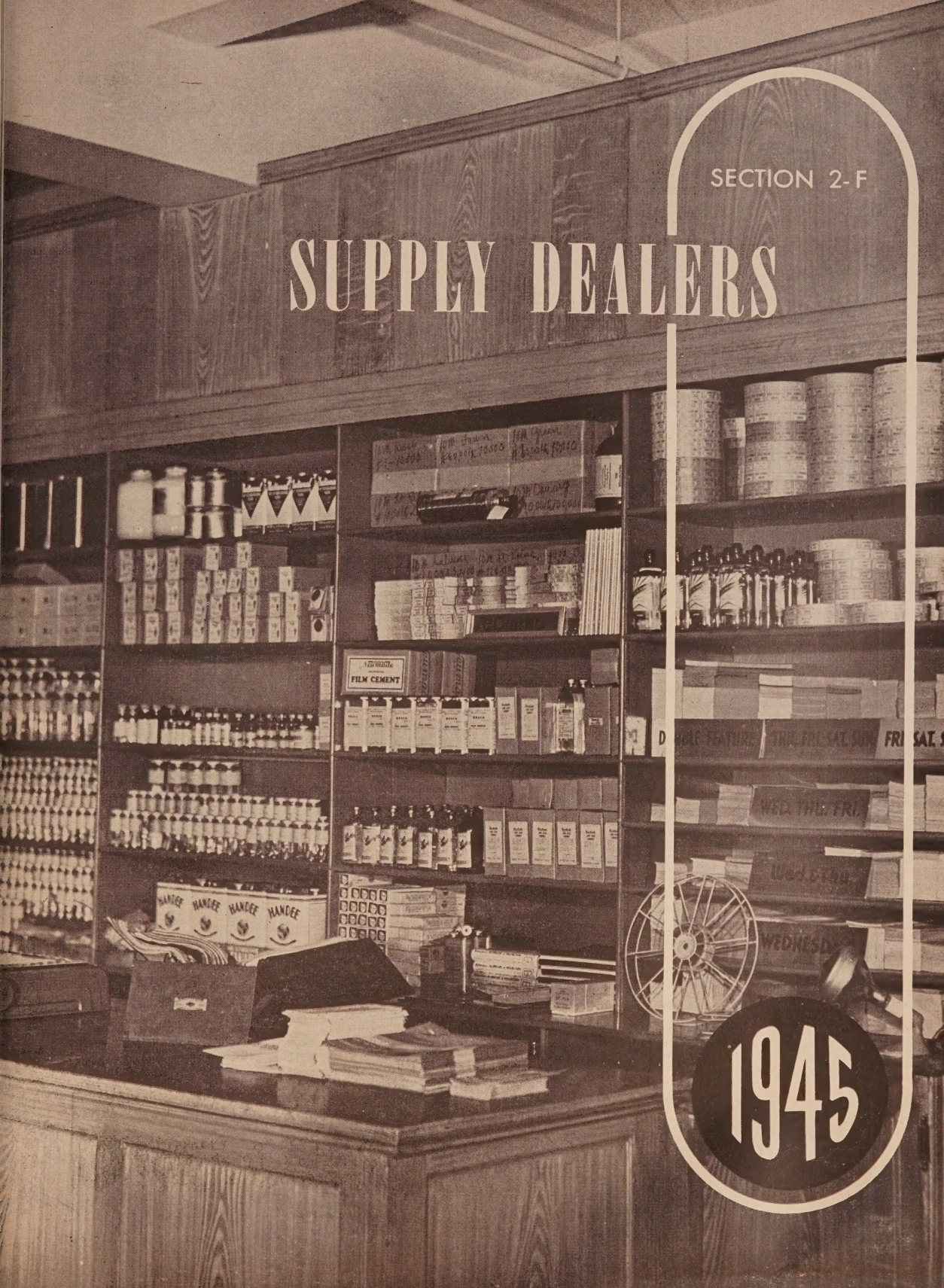
SIMPLE TO OPERATE—All operating valves easily accessible. Not necesarry to check pressures or temperatures. No need to shut down the system.

POWER SAVINGS—Power savings, due to a reduction in head pressure will pay for the "Little Giant" many times over.

MANUAL OPERATION—Fully manually operated, there is no possibility of a slow leak developing which would cause a loss of refrigerant before cause is discovered.

Write us for full particulars and instructions for installation and operation

MUELLER BRASS CO.
PORT HURON, MICHIGAN



SECTION 2-F

SUPPLY DEALERS

1945

The Supply Dealers of the United States

Comprehensive Listing of Names, Addresses, Personnel, Products, and the Areas Served

ALABAMA

THE QUEEN FEATURE SERVICE, INC.
1912½ Morris Ave., Birmingham 3
Telephone: 3-8665
PERSONNEL—*Manager:* Miss Vivian Harwell—2-6754. *Sales Manager:* J. Braxton Colley—52-2666
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Products Sold: National Theatre Supply Export Line

WESTERN ELECTRIC CO. OF BRAZIL
Rua Dos Guaimazes 151, Sao Paulo, Brazil
Products Sold: Western Electric Export Line

WESTERN ELECTRIC CO.
Sarrano 771, Concepcion, Chile
Products Sold: Western Electric Export Line

WESTERN ELECTRIC CO.
Luis Uribe 441, Iquique, Chile
Products Sold: Western Electric Export Line

***PHILIPS CHILENA, S. A.**
Bellavista 0112, Santiago, Chile

***CARLOS GLUCKSMAN S.**
Moneda 973, Oficina 1014, Santiago, Chile

***CORPORACION DE RADIO DE CHILE, S. A.**
Vicuna Mackenna 3333, Santiago, Chile

***MARTINEZ Y CIA, LTDA.**
Agustinas 1055, Piso 3, Oficina 5, Santiago, Chile

WESTERN ELECTRIC CO.
Edificio Sud America, Bandera Esquina Agustinas, Santiago, Chile
Products Sold: Western Electric Export Line

COMPANIA NACIONAL DE TEATROS, S. A.
Casilla Postal No. 841, Valparaiso, Chile
PERSONNEL—*Manager:* Juan Troni Enrico
AREA SERVED—Valparaiso, Vina del Mar, Santiago

WESTERN ELECTRIC CO.
Teatro Valparaiso, Valparaiso, Chile
Products Sold: Western Electric Export Line

***G. WIDOW & CIA**
Esmeralda 939, Casilla 1021, Valparaiso, Chile

***CINE COLOMBIA, S. A.**
Carrera 7, No. 22-47, Bogota, Colombia

J. GLOTTMAN, S. A.
Carrera 7, No. 18-40
Apartado Aereo 4183, Bogota, Colombia
PERSONNEL—*Manager:* Jack Glottman
Products Sold—National Theatre Supply Export Line

WESTERN ELECTRIC CO.
Calle 23, No. 6-24, Bogota, Colombia
Products Sold: Western Electric Export Line

***RAFAEL PINZON & CO.**
S. en C., Plaza del Centenario, Cartagena, Colombia

***CINE COLOMBIA, S. A.**
Edificio San Feranco, Medellin, Colombia

SOCIEDAD RADITECNICA ECUATORIANA
Venezuela 60-Quito, Casilla 414-Quito, Guayaquil, Ecuador
PERSONNEL—*Owner:* Luigi Rota. *Manager:* Marcello Cameo
Products Sold: National Theatre Supply Export Line
COUNTRY SERVED—Ecuador

J. CALERO PAZ, S. A.
Portal de Belen No. 102/14, Lima, Peru
PERSONNEL—*Manager:* Jose Calero Paz
Products Sold: National Theatre Supply Export Line
COUNTRIES SERVED—Bolivia, Ecuador, Peru

WESTERN ELECTRIC CO.
Edificio Hidalgo No. 150 y 154, Plaza, San Martin, Lima, Peru
Products Sold: Western Electric Export Line

CINEMATOGRAFICA GLUCKSMANN, S. A.
Rio Branco 1320-26, Montevideo, Uruguay
PERSONNEL—*Owner and Manager:* Bernardo Glucksmann
Products Sold: National Theatre Supply Export Line
COUNTRY SERVED—Republic of Uruguay

JOAQUIN MARTI
Mercaderes a Gorda, Caracas, Venezuela
Products Sold: National Theatre Supply Export Line

STANDARD ELECTRIC, S. A.
Gorda a Aserradero 32/34, Caracas, Venezuela
PERSONNEL — *Manager:* Jose Castaneda Cundaro
Products Sold: RCA and National Theatre Supply Export Lines
COUNTRY SERVED—All of Venezuela

WESTERN ELECTRIC CO.
Cipreses a Miracielos No. 1-1, Caracas, Venezuela
Products Sold: Western Electric Export Line

STRAITS SETTLEMENTS

WESTERN ELECTRIC CO. OF ASIA
Tanah Aband No. 2, Batavia Centrum, Java
Products Sold: Western Electric Export Line

WESTERN ELECTRIC CO. OF ASIA
187 Cecil St., Singapore
Products Sold: Western Electric Export Line

WESTERN ELECTRIC CO. OF ASIA
Thai Vatana Phanitch, Asdang Rd., Bangkok, Thailand
Products Sold: Western Electric Export Line

WEST INDIES

WESTERN ELECTRIC CO.
Valencias 192, Camaguay, Cuba
Products Sold: Western Electric Export Line

ANTIGA CO., S. A.
Oficina y Salon de Ventas, Obispo No. 153, Havana, Cuba
PERSONNEL—*Vice-President:* Enrique Antiga
Products Sold: N. V. Philip's Line, Holland

NATIONAL THEATRE SUPPLY OF CUBA, S.A.
Consulado 112, Havana, Cuba
Products Sold: National Theatre Supply Export Line

***J. F. SAN ROMAN**
J. A. Saco 204, Havana, Cuba

WESTERN ELECTRIC CO.
Industria 307, Havana, Cuba
Products Sold: Western Electric Export Line

JOAQUIN GINEBRA
Isabel La Catolica No. 43, Ciudad Trujillo, Dominican Republic
PERSONNEL—*Owner and Manager:* Joaquin Ginebra
Products Sold: National Theatre Supply Export Line
AREA SERVED—Dominican Republic, W. I.

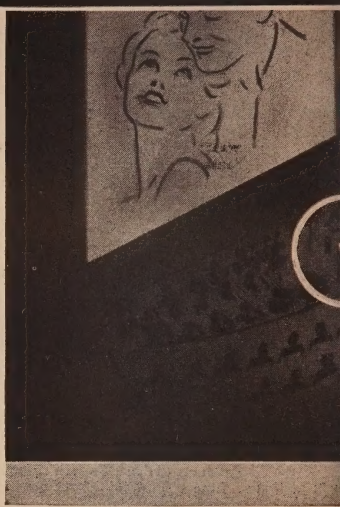
***AGENCIAS UNIDAS DOMINICANAS, C. POR A.**
Arzobispo Merino 113, Ciudad Trujillo, Dominican Republic

EDUARDO G. GONZALEZ
P. O. Box 3871, San Juan, Puerto Rico
PERSONNEL—*Owner and Manager:* Eduardo G. Gonzalez
Products Sold: National Theatre Supply Export Line
AREA SERVED—Puerto Rico

WESTERN ELECTRIC CO.
Film Center Bldg., San Juan, Puerto Rico
Products Sold: Western Electric Export Line

* Listing not Confirmed by Supply Dealer

YOUR STAR ATTRACTION INSIDE AND OUT



Whether you're planning to remodel or to build a complete new theater, one star you'll want to give "top billing" to is *light*—plenty of it, and the right light in the right place.

To get the most out of the money you invest in lighting, *look to Westinghouse* . . . for the best in bright, long-lasting lamps . . . for sound, practical assistance in assuring theater lighting that's both effective and efficient.

With Westinghouse, theater lighting is a specialty! In one complete line, Westinghouse offers you the right lamps for *every* purpose, from giant outdoor floods to the small incandescent that lights the orchestra conductor's music. There are new Westinghouse Lamps, too. . . . Westinghouse Slimlines that make possible completely new uses for fluorescent lighting . . . and Westinghouse Circlines, beautiful rings of light, that provide a unique opportunity for imaginative lighting effects.

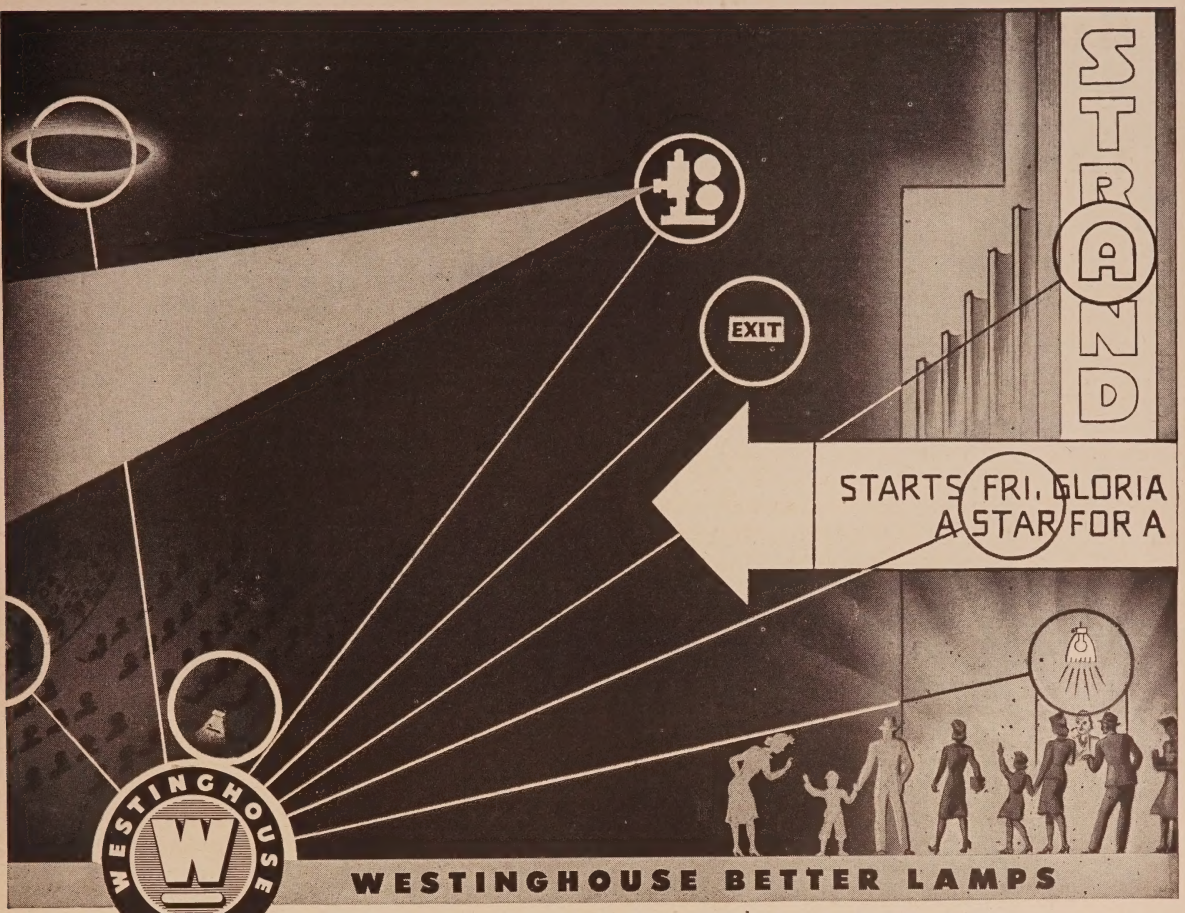
For the right lamp for every theater lighting need, see your nearest Westinghouse distributor. He will supply you with up-to-the-minute information on your lighting requirements. For the latest ideas on using lighting to attract more patrons and keep them coming back, write to Westinghouse Electric Corporation, Lamp Division, Bloomfield, N. J., for a *free* copy of the 32-page 2-color illustrated book—"Westinghouse Lamps for Theaters."

When you buy lamps . . . be sure they're Westinghouse!

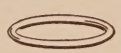
Westinghouse Lamps

PLANTS IN 25 CITIES ○ OFFICES EVERYWHERE

Bright . . . Long Lasting



1 WESTINGHOUSE CIRCLINE LAMPS



The new, glamorous form of lighting that combines smart, modern decorative value with ample, economical illumination.

2 WESTINGHOUSE RECTIGON BULBS

For bright, steady, flickerless arc projection you can count on dependable, long lasting Westinghouse Rectigon Bulbs! 1200 hours of service guaranteed!

3 WESTINGHOUSE FLUORESCENTS

The modern, economical light source! Even, well-diffused, cool, soft light for lobby, lounge, or rest rooms.

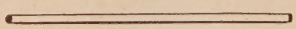
4 WESTINGHOUSE INCANDESCENTS

For marquees, for signs, for ticket booths—wherever you want bright, localized lighting—there's a Westinghouse Incandescent to do the job—perfectly!

5 WESTINGHOUSE FLOODLIGHTS

Ideal for flood-lighting the parking area. Use the tubular Westinghouse Mercury vapor or 1000w PS 52 incandescent lamps.

6 WESTINGHOUSE SLIMLINES

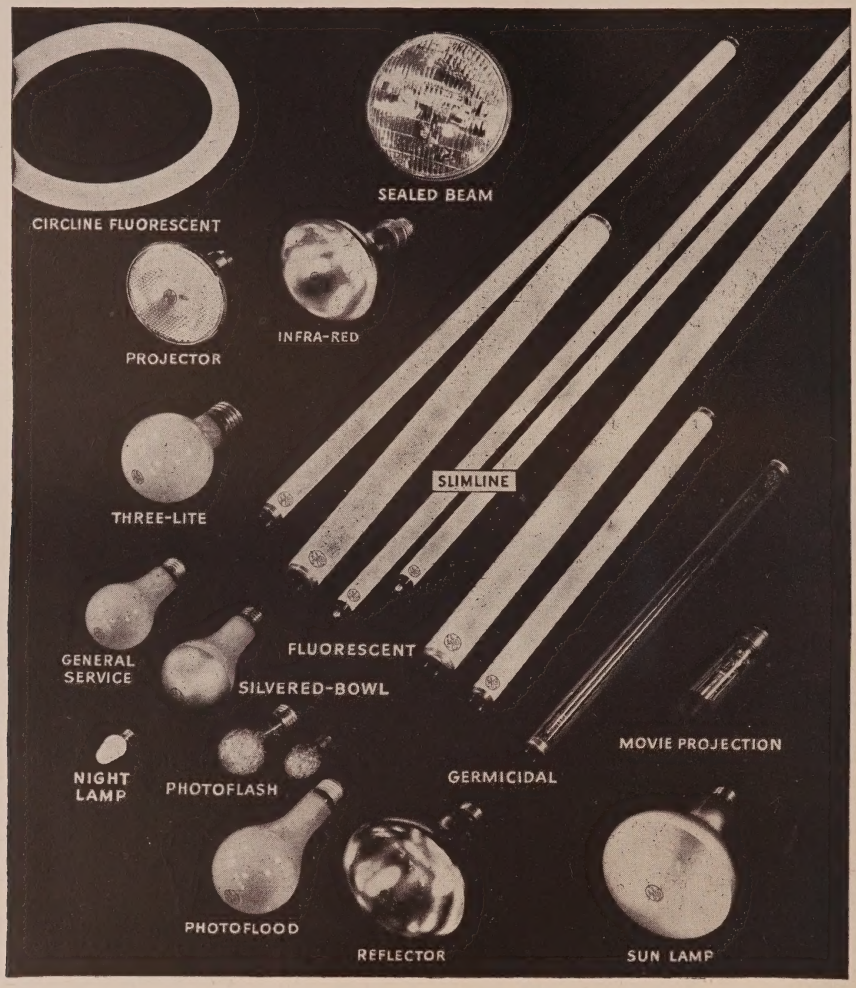


These new extra-slim fluorescents are extra long—fit easily into cramped quarters. You'll want them for decorative, economical, *ultra-modern* lighting effects!

© 1945, Westinghouse Electric Corporation

Buy G-E Lamps for Theatre Lighting

There's a G-E Lamp for every Theatre Lighting need. Just a few are shown here. For more specific information on any lighting problem, *consult your nearest theatre supply dealer who sells G-E Lamps.*



G-E Fluorescent Lamps in gold, pink, blue, green, red, white and daylight facilitate the use of color for decoration, or for general light. They are recommended where equipment provides good power factor.

New, slender *G-E Slimline Fluorescent Lamps* are ideal for wall coves, wall toning, edge lighting and the modern concealed lighting behind attraction display panels in lobbies and foyers. New *G-E Circline lamps* help make walls and ceilings more attractive. New adjustable *G-E Projector* and *Reflector lamps* provide flexible spotlighting or floodlighting.

Ask your supplier about *new* G-E light sources and remember . . .

The Constant Aim of General Electric Lamp Research is to Make G-E Lamps . . .

Stay Brighter Longer

G-E LAMPS

GENERAL ELECTRIC

A CLEANER THEATRE BUILDS BOX-OFFICE!

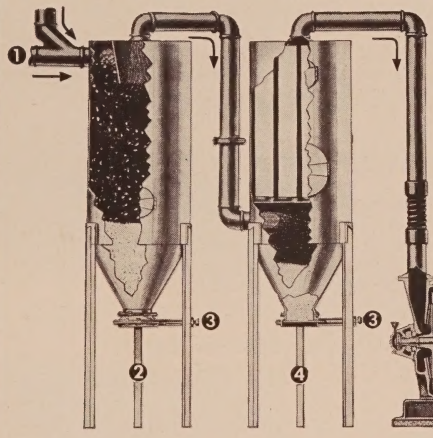
That's why EXIDUST is the most widely used heavy-duty vacuum cleaner today!

It's a pleasure for your patrons to walk into a fresh, clean theatre . . . be surrounded by bright, colorful interior decorations . . . breathe pure air. Daily cleaning with EXIDUST stationary or portable vacuum cleaners creates and preserves this atmosphere in thousands of today's most popular theatres—*and consistently builds box-office!*

EXIDUST stationary cleaning systems with vacuum producers in the basement, or EXIDUST portable cleaners, are simple to handle and operate—seldom need repairs. Carpets, walls, draperies, seats . . . all are rapidly cleaned and brightened by EXIDUST. There's a complete line of EXIDUST portable and stationary models to meet the architectural limitations of every theatre.

Your investment in an EXIDUST is quickly repaid by savings in redecorating costs, less carpet shampooing — *and higher box-office!* And EXIDUST serves for years. For instance, a 3-H.P. stationary EXIDUST has served 20 years in the Brooklyn Orpheum Theatre . . . a 10-H.P. stationary EXIDUST is efficient after 19 years in the R. K. O. New York Proctor Theatre . . . and two 10-H.P. stationary EXIDUSTS installed in the Brooklyn Fox Theatre in 1928 are still going strong!

EXIDUST Central (Stationary) Vacuum Cleaning System



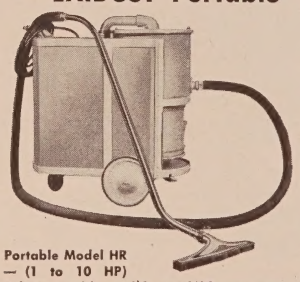
The dust-laden air enters the Primary Separating Tank at the left, where most of the dust is removed. The remainder of the dust is then removed in the Secondary Separator and Filter Tank, from which the Allen Billmyre Vacuum Producer withdraws the cleansed air and discharges it to outside atmosphere.

❶ From stationery vacuum piping system. ❷ Primary separator tank. ❸ Slide-gates for removal of accumulated dust. ❹ Secondary separator and filter tank. ❺ Centrifugal exhauster. ❻ Discharge of cleansed air to atmosphere. ❼ Electric motor or any other power drive.

An EXIDUST Central Vacuum Cleaning System consists of 4 Units:

- **A** Powerful Centrifugal Exhauster especially built for heavy duty vacuum cleaning. It provides thorough cleaning suction at low operating and maintenance cost.
- **B** Separating Tank System which filters dirt and dust particles from the vacuum line and discharges only clear air through Exhauster into the outside atmosphere.
- **C** Stationary Piping System with conveniently located Vacuum Outlets throughout area to be cleaned. One or many workers can clean simultaneously.
- **D** Variety of Cleaning Tools and Flexible Suction Hoses with which dust and dirt are easily and thoroughly vacuumed to Piping Outlets and thence to Separating Tank System where it is collected.

EXIDUST Portable



AB-817

Portable Model HR — (1 to 10 HP)
Other portable models available, also custom-built models for special requirements.

Write today for Bulletin

EXIDUST is manufactured by
ALLEN BILLMYRE COMPANY
471 Fayette Ave., Mamaroneck, N. Y.

EXIDUST
HEAVY-DUTY VACUUM CLEANERS

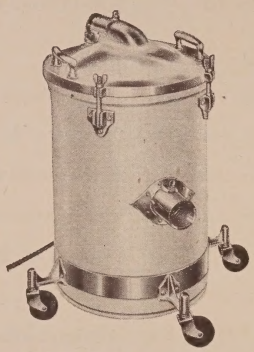
CLEANER THEATRES

LESS FIRE HAZARD

Quicker Cleanups

of Motors—Rugs—Draperies

with TORNADO ELECTRIC BLOWERS VACUUM CLEANERS



MODEL 235

NOISELESS VACUUM CLEANER

1 h.p. G. E. universal motor. Plugs in at any electric outlet. Air-cooled motor. Maroon enamel, rust-proof tank of large capacity. Weighs less than 45 lbs. Portable anywhere.

NOISELESS! The only sound you can detect from the Model 235 is the rush of air when operating this powerful Cleaner. No disturbance. Can be used while performance is in progress.

POWERFUL. A full horsepower General Electric ball-bearing universal motor, in combination with multi-stage turbine fans, develops a powerful working suction. Cleans dust and dirt from deep pile carpets, rugs, curtains, floors, etc.

LARGE CAPACITY. Large-size tank makes it unnecessary to empty tank frequently. All the dirt is deposited in the tank. Large filter area, which is easily removed and cleaned, gives liberal discharge of air. Air is filtered twice before it reenters the atmosphere, insuring pure air discharge.

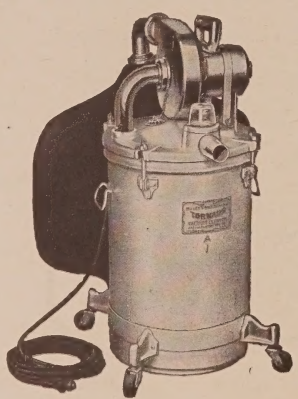
MODEL 225 is another of the TORNADO Noiseless Vacuum Cleaners. Slightly larger than the Model 235, it has the same noiseless feature, easy portability, large capacity and economy of operation.

Reduced Cleaning and Maintenance Expense

With the dust bag mounted outside the tank, and only heavier particles going into the tank, there is no danger of damaging or breaking the fan. Besides, the air outlet is kept completely open for free passage of air at full force, providing quicker, better cleaning.

New, Exclusive Design Increases Capacity

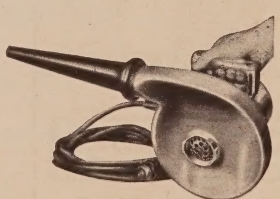
The method of exhausting the air in the TORNADO design makes the unit clean faster with its more powerful suction. A full 12-gallon tank makes it easy to clean large areas without emptying the dirt and dust. Absence of bag inside the tank permits handling soot, water, sawdust and other bulky materials. Unit is provided with a set of standard attachments for general cleaning of walls, floors, etc. Other attachments available.



MODEL 112

PORTABLE VACUUM CLEANER

1 h.p. G. E. universal motor mounted on Norma ball bearings. No oiling. Tremendous cleaning power. 49" waterlift — 180 c.f.m. 12-gallon tank mounted on easy-rolling castors. Weight, 40 lbs.



Cleaner Motors Reduce Fire Hazard

MODEL 10-A

TORNADO ELECTRIC BLOWER

Blows out dust, dirt, lint from motors, keeps them clean with less danger of sparks igniting fine particles of dust. 1 h.p. G. E. motor. Air speed 295 m.p.m. Weight, 14 lbs.

Request complete details and FREE TRIAL Offer

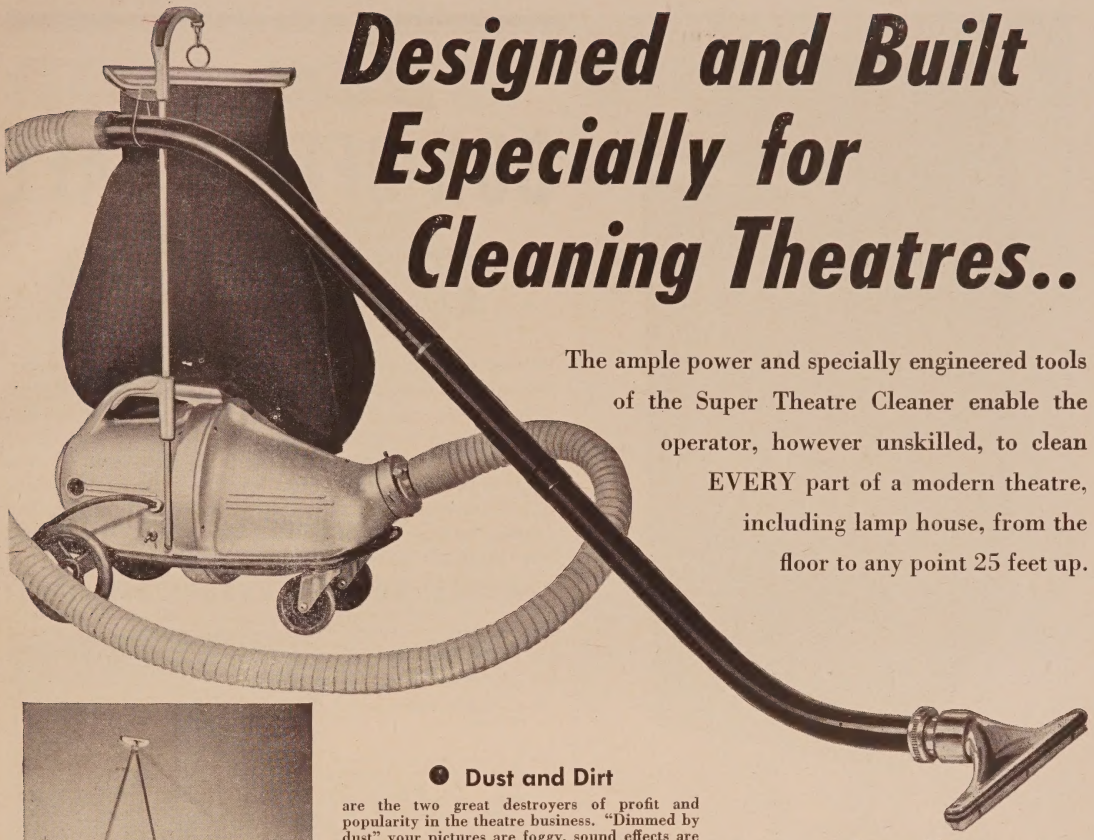
TAKE THE DUST OUT OF INDUSTRY with BREUER'S BALL BEARING TORNADO PORTABLE INDUSTRIAL VACUUM CLEANER

BREUER ELECTRIC MFG. CO.

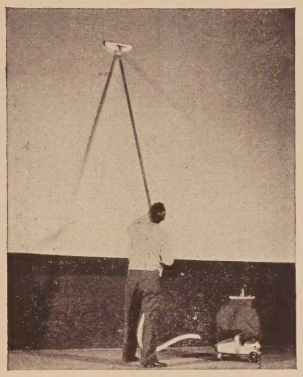
5086 N. RAVENSWOOD AVENUE

CHICAGO 40, ILL.

Designed and Built Especially for Cleaning Theatres..



The ample power and specially engineered tools of the Super Theatre Cleaner enable the operator, however unskilled, to clean EVERY part of a modern theatre, including lamp house, from the floor to any point 25 feet up.



● THE SAME CLEANER AND THE SAME MAN CLEANS THE FLOOR AND CLEANS THE SCREEN

● Dust and Dirt

are the two great destroyers of profit and popularity in the theatre business. "Dimmed by dust" your pictures are foggy, sound effects are muffled, the most beautifully furnished lobby looks shabby. Dirt on the floor and on furnishings means soiled clothing of patrons—what will a pair of white gloves look like after they have slipped from the lady's lap to the floor of your theatre?

It Cleans Everything

The Super Theatre Cleaner is equipped with 50 feet of long-wearing rubber covered cord which permits the operator to clean over a radius of 100 feet from any wall outlet or light socket. The floor tool goes easily under any space as little as 3½ inches high. The Hi-up Tube is 10 feet long. Two or three of them can be fitted together giving operator an effective cleaning range 15, or 25 feet up from his reach. This cleans screen, drapes, walls, box fronts—all high places. Powerful motor of The Super makes cleaning 100% effective even at such long distances from the cleaner. Special tools are provided for screen cleaning, clearing sound holes, floor surfaces of all kinds, upholstered furniture, statuary and ornamental objects, walls, etc.

Easy To Use

The Super is light—anybody can easily carry it about. It follows operator readily when pulled along. Hi-up Tube weighs only 53 ounces. All tools are light—made of modern light-weight metals of great strength. Screen brush is goat's hair, renews and prolongs life of screen, enhances clarity of picture and sound.

It Saves Money

A Super Theatre Cleaner pays back its cost over and over again in labor-saving and lengthened life of all the things it cleans. A steady decrease in operating overhead always follows purchase of a Super. And the whole place takes on new life. Janitors freed from back-breaking drudgery have time to do many other things about the house. Box office receipts increase with flow of patronage to a bright clean theatre. Health and Fire inspection authorities are pleased.

Not a "Domestic"

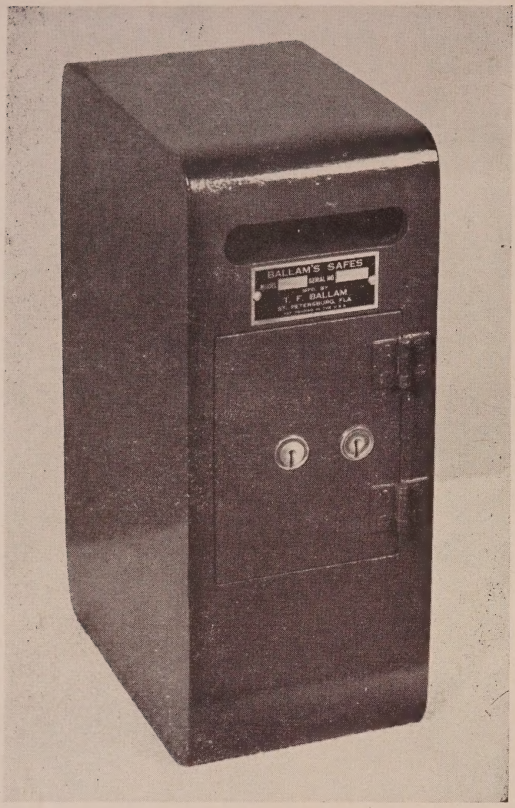
Do not confuse the Super with the conventional residence type of suction cleaner. The Super is a heavy-duty cleaner, engineered and tooled for theatre cleaning.

Weaker cleaners do not and can not clean thoroughly nor can they stand the strain of the heavy work necessary if a theatre is to be truly cleaned. The motor-driven brush types are especially hard on carpets—ask any good rug salesman. Super Suction raises the trampled nap and draws the dirt and grit from the warp where it does the real harm, keeping the rug looking new and bright and giving the owner much more service.

Thousands of Super Theatre Cleaners are in use—many of them after years and years of service. When needed, replacement parts are always available. Upkeep cost is practically nil even after years of use. Every Super is fully guaranteed.

Ask Your Wholesaler or Write

NATIONAL SUPER SERVICE COMPANY, INC.
1947 NORTH 12th STREET • TOLEDO 2, OHIO



Ballam's
BOX-OFFICE SAFE

Protects Your Cash Against HOLD-UPS!

A tried and proven repository for Box-Office Cash that permits the cashier to keep only the necessary change in her easily accessible cash drawer. Properly installed, the hold-up man must gain admission to the ticket booth and with heavy tools spend upwards of one hour to pry your Box-Office Safe from the booth joists. Intimidated as she may be, it is impossible for the cashier to open the Box-Office Safe without the second key from the Manager's Office.

STRONG! HOLD-UP PROOF! EFFICIENT!

SPECIFICATIONS

BODY—Body of Safe, ¼ inch machine steel welded thruout. Outside dimensions: 12½" high, 5" wide, 7½" deep. Inside dimensions: 12" high, 4¼" wide, 7" deep. Capacity: 335 cubic inches.

DOOR—Door and front of Safe, ½ inch machine steel welded throughout. Top, front and bottom of the door fits in rabbeted body of Safe. Rear of door interlocks ⅜ of an inch from top to bottom with body of Safe, making it just as securely locked with the hinges removed as it is with them on. In fact, the hinges are put on so they can easily be unscrewed, preventing them from being forced off by gangsters, and damaging the Safe. Their only purpose is to swing the door open and shut.

LOCK—Lock is a high-grade double-nose lock, requiring two different keys to open. A heavy hand of steel, closely fitted, completely covering the lock, is securely bolted to the ½ inch door, preventing the lock from being punched through if attacked, is standard equipment.

CURRENCY CAPACITY—Money slot, at the top front of Safe, 3½" x ⅝", will take fifty one-dollar bills at one time. It is protected with saw tooth baffle plate to prevent fishing money out of Safe.

OUTSTANDING FEATURES:

A. Saw tooth baffle plate on currency slot.

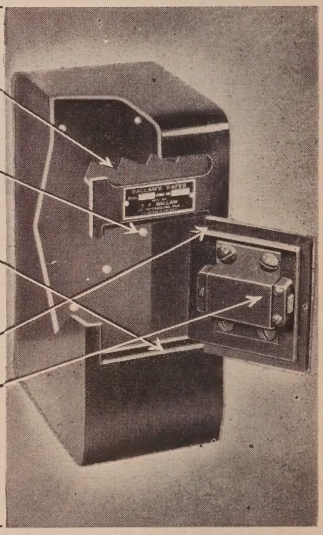
B. Five holes through ¼" machine steel, accommodates round headed wood screws, situated in back at random widths to accommodate any location.

C. Rabbet-edge frame permits counter sunk door thereby preventing the use of a pry bar to open.

D. Interlocking flange of door slides behind frame when closing and, together with lock presents a securely locked door even if hinges are removed.

E. Heavy band of steel prevents lock from being punched thru.

If booth wall is frail, reinforce by fastening a board, same size as back of safe, to studding with screws, then anchor safe to board. Put safe in most convenient place for cashier to deposit the surplus money as fast as taken in, leaving just enough for change.



SOLD BY LEADING
THEATRE SUPPLY DEALERS

Price: $33.50
F.O.B. Factory—Subject To Change

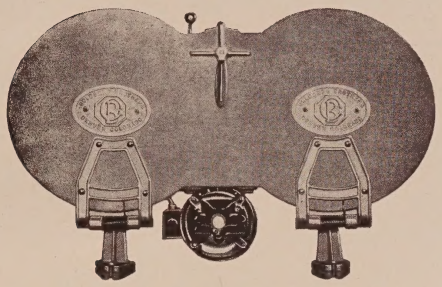
MANUFACTURED BY

THOMAS F. BALLAM

Dealer in the Mosler Fire Resistive Safes and Circular Door Burglar Resistive Chests bearing the Underwriter's label.

1206 Seventh Avenue North
St. Petersburg 6, Florida

GOLDBERG BROTHERS
METAL PRODUCTS



NEW AUTOMATIC FILM REWINDER

Passed by the board of Fire Underwriters, accommodates 15-inch reels and smaller . . . reels slip on spindles quickly and easily. The rewinder is equipped with an automatic stop.

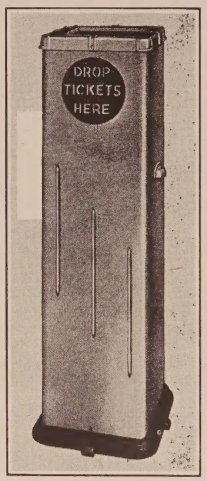
New Goldberg Rewinder is made of heavy metal, carefully machined . . . doors open on extra heavy counter-balanced spring hinges . . . a large handle keeps the door perfectly tight. A control handle for starting.

GOLDBERG TICKET BOX

Attractive looking, made of heavy high grade steel, baked enamel crackle finish and aluminum polished top. Made in two styles: G.T.B. has glass baffles and cast iron base. P.T.B. has no glass baffles nor cast iron base. Top has slot for depositing tickets.

Made in following colors:

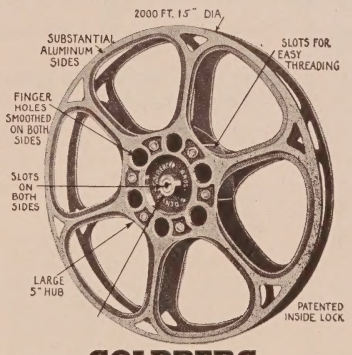
ALUMINUM RED
LIGHT BLUE



"NO DRAFT" SPEAKING TUBE

Prevents Drafts . . . Dependable
Good Looking . . . . Economical

You do away with colds, sore throat and the necessity for leave of absence once you install this efficient speaking tube. It's clever, good-looking and will fit any opening from 2¼" to 4¼". Consists of two rust resisting metal plates, chromium plated, with washers and a screw . . . easy to install.



GOLDBERG CAST ALUMINUM REELS

(Patented)

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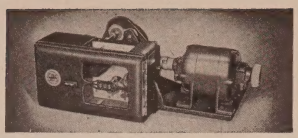

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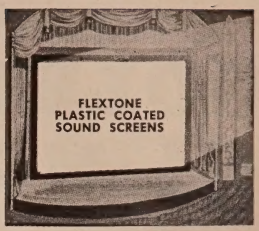

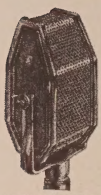

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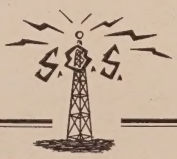

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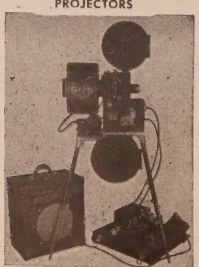

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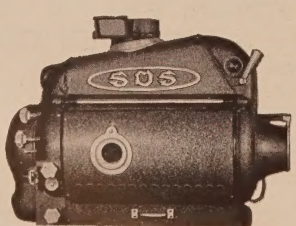

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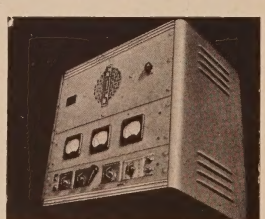

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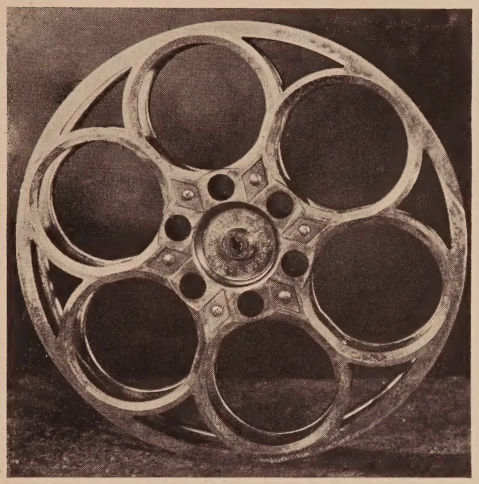

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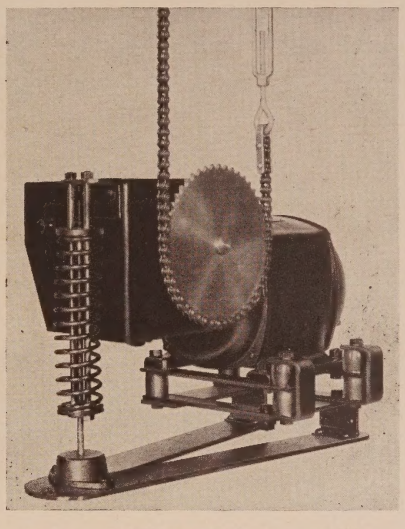
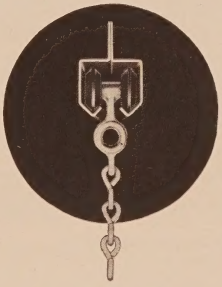


Model LD CURTAIN CONTROL—For light draw curtains; rubber insulated automatic take-up base; silent chain drive insuring positive timing. ¼ H.P. motor is instantly reversible without stopping motor; furnished in 55, 105, 175, or 212 ft. per minute. Weight: 55 lbs. Floor space, 17" x 9½".



Model LT CURTAIN TRACK—Light duty curtain track, absolutely noiseless, all steel construction, semi-resilient wheels, all sheaves ball bearing, holes every six inches on rib of track for suspension mounting, with 2", height 3", distance from bottom of carrier chain to top of track, 8".

Model ST CURTAIN TRACK—Heavy duty curtain track, absolutely noiseless, steel construction with processed V Maple track and non-metallic wheels, all sheaves ball bearing, holes every six inches on rib for suspension mounting, width, 4", height, 4½", distance from bottom of carrier chain to top of track, 12".

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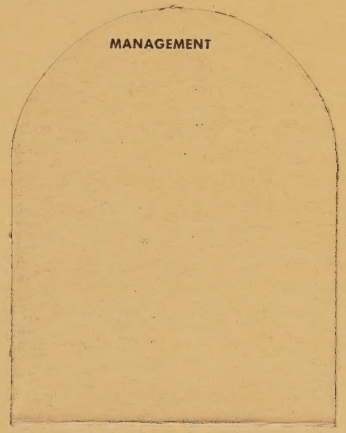


SECTION 3 - A

SERVICES

1945

Service Companies in Efficient Management

Regular Attention by Those with Know-How Valuable for Maintaining Top Performance

It was a furniture salesman who unwittingly made a most profound observation on modern business. "The trouble," he said, "with business nowadays is that the customers know too much."

For better, or for worse, no one can deny that the public is waking up. Every day they read or hear about some new development, remarkable invention, brilliant discovery that will bring untold improvements and thrills to their humdrum existence. We have reached the stage now where developments such as radar, atomic energy, television, and FM (frequency modulation) are not only accepted, but expected, as normal adjuncts to everyday living. With respect to FM and television, theatre managers, in particular, have sat up and taken notice. Many are asking themselves how these developments will affect the motion picture industry. Will television, in its final perfected stage, cut into motion pictures as a source of entertainment? Others, optimistically point out that the invention of the radio never even dented box-office receipts—that the motion picture industry could never be replaced as the "universal art form."

Many are inclined to shake disapproving fingers in both directions—at those who see the decline of "movies" in the entertainment field, and those who guarantee its unimpeachable hold on the public.

Motion pictures, as a source of entertainment, have no immediate contender in the field. It is the individual exhibitor who must meet the challenge of improvements—especially in the field of sound reproduction. With the many advances that have been made in recording color and sound on film, this is not a problem to be viewed lightly. While it is true that new reproducing equipment is designed to match the pace set by the studios in Hollywood, this offers no solution to those exhibitors who are not yet ready to install new systems.

The problem for the average exhibitor is how to obtain the finest possible results with the equipment he owns. This brings up the question of what results do exhibitors hope to achieve from the operation of their theatres. Profits, obviously. But profitable operation depends upon a number of factors—the programs he selects, its advertising and promotion, and the location and physical aspects of his house. An efficiently run theatre heeds all these cardinal factors. True showmen are as much concerned with the impressions that patrons take away with them as they are with the admissions they leave at the box office; the latter grows in direct relation to the former.

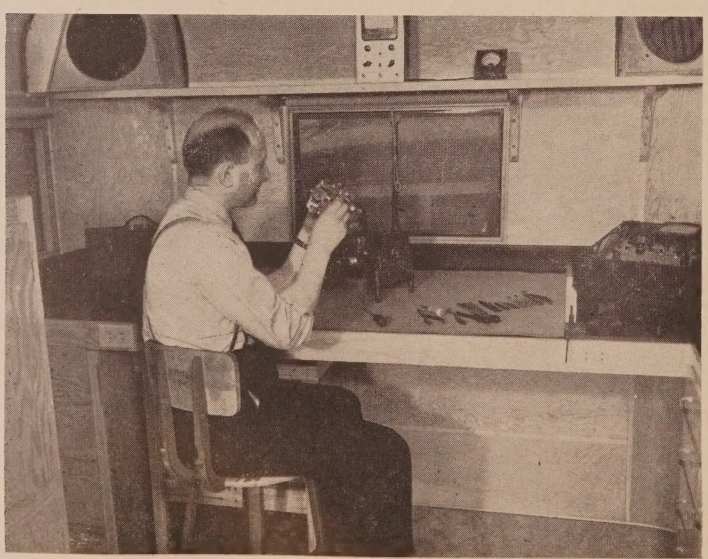
Let us not make the mistake of assuming that the exhibitor who can purchase billings on second or third run only, who is located off the main thoroughfare, is automatically a loser. Efficient management can reap capacity profits from the least pretentious house. This implies that efficient management not only attracts patrons, but builds up a steady repeat business. After all, when we consider what it is that draws patrons to a theatre, we must admit to three factors: the pictures, first of all; the comfort of the surroundings and the ease with which the patrons can hear and see the picture.

While these factors can be listed in order of importance, not one can be omitted from the line-up. A picture may be an outstanding box-office attraction, but what happens to it inside the theatre may be another story. If there is an objectionable flicker, if patrons have to strain to understand the dialogue, if after a while the sound stops or the screen becomes dark for a minute or so, the value of the show is definitely diminished.

Obviously, when patrons have purchased their tickets, they have purchased more than the right to enter the theatre. They have purchased the right to see the show comfortably, undisturbed, and presented in such a manner that they are unaware of the mechanics of reproduction.

The operation of theatres is, therefore, quite different from the operation of any other business enterprise primarily because public taste in the matter of entertainment is an extremely variable factor. Thus the problems encountered by exhibitors and managers in presenting a completely satisfactory commodity, that is, entertainment acceptable to the public, are unique in their relationship to good management. Not only must the picture on the screen be satisfactory as to plot, photography, artistic value, and sound reproduction, but the theatre environment must be modern, comfortable and relaxing. Assuming these requirements have been satisfied, as in every business, it is extremely important that the theatre property and operating equipment be well maintained to assure continued satisfaction to the theatre patrons, and to protect the investment in the theatre property. Thus, it is a definite requirement that the theatre be cleaned regularly, that the seats be kept in good condition, that the theatre building be kept in repair, that the air-conditioning and heating equipment function properly, that the projection and sound equipment be maintained in good repair, and, in general, that the overall theatre property be completely maintained. Many maintenance functions are most readily carried out by personnel in the employ of the theatre, but there are

PROJECTOR SERVICE, in the 16-mm, no less than in the 35-mm. field, is an essential part of efficient operation. In the workroom of the Bell and Howell Company Service Craftsman trailer, the serviceman is looking over a projector. As it should be in the commercial theatre, preventive service — that is, periodic inspection, cleaning, lubrication, replacement of worn parts — is very important in successful operation. (Bell and Howell photograph).



certain requirements, such as service on sound equipment, which are more economically and satisfactorily handled by a service company on a contract basis.

The well-organized service company is able to do this job economically and satisfactorily because it has the resources and maintains personnel on a nationwide basis to serve the theatre industry. It has experience gained through the years since the inception of sound, it has trained personnel equipped with the most modern electronic test instruments, and it has research facilities to provide its personnel with up-to-date information on theatre sound equipment. Field engineers receive the benefits of continuous research in electronic sound recording and reproduction, acoustics, optics, and television.

The most efficient and economical procedure, as determined from years of experience, is to render service to theatre sound systems at regularly scheduled intervals. The trained service representative, on his call to the theatre, can thoroughly inspect the equipment, make overall checks of electronic circuits, and make any necessary replacement of parts. He also can check mechanical devices and make adjustments, where necessary, to avoid the possibility of a shut-down. Thus, month-to-month the exhibitor is assured of standard performance. All this work is carried out with no additional work on the part of the exhibitor. In other words, the service company sees to it that the sound equipment functions at its best, thus relieving the exhibitor of worry and permitting him to devote his time to the essential job of managing and exploiting his theatre.

In addition, the service company keeps its field staff available for emergency service. No individual can provide the efficient emergency coverage that is furnished by a national organization. Accidents, illness, or death in the service company's personnel do not interfere with its normal and emergency service coverage.

PROJECTION SERVICE

In the matter of projection, the ultimate aim is to make the patrons become mentally a part of the story of the picture, with total absence of either conscious or unconscious strain. This depends, for the most part, upon proper screen illumination, the size of the screen and its condition. The entire projection system, being a combination of intricate mechanical and electrical units, requires careful handling. The various working parts of the system are designed to operate most efficiently when adjusted and maintained within the limits prescribed by the manufacturer. Exhibitors know from experience that wear and tear on a projection machine is abnormally high. The condition of the intermittent mechanism must be watched closely, as worn intermittents not only reduce the life of the projector head, but the life of release prints, as well. While the exhibitor may see no immediate connection between preserving the life of release prints and his own efficiency, he must realize that, in the long run, he is the one who foots the bill for the entire cost of the picture.

SOUND SERVICE

In the matter of sound reproduction, the problem is even more involved. While a picture is enlarged from the film to the screen a few hundred times, sound is amplified several million times from the initial impulse to the time it is projected from the loudspeakers. Consequently, any imperfections entering into the reproducing equipment, have a much greater effect on the quality of sound reproduction than they might have on the projection of the picture.

The sound apparatus is a highly specialized system, employing delicate electronic circuits and precise mechanical equipment, all of which require many accurate adjustments properly to reproduce the sound as recorded on the film. While such adjustments are normally made at the time of installation, the equipment nevertheless requires regular attention to be sure the adjustments are accurately maintained. Also, electronic parts such as tubes, resistors, and condensers are subject to deterioration, and mechanical parts are subject to wear, all of which contribute to poor sound reproduction if these parts are not replaced in time. Thus, the sound system, because of its complex nature, needs frequent inspection, preferably on a regularly scheduled basis, to insure peak performance and, in turn, satisfied patrons.

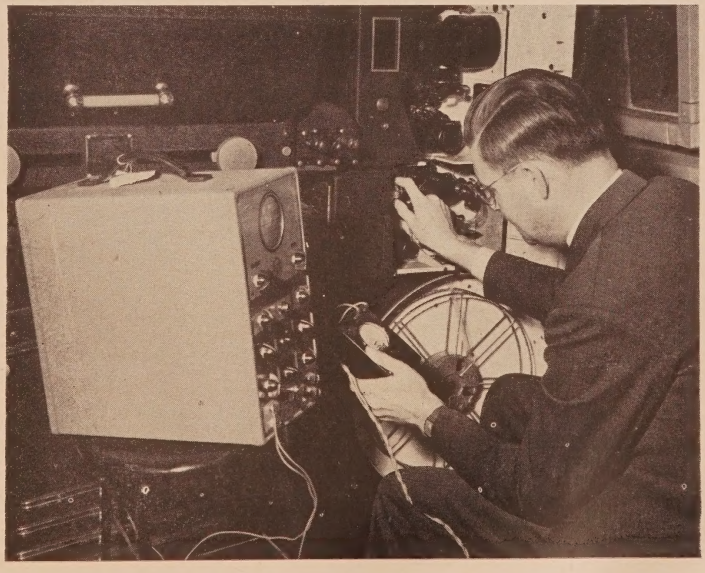
Probably the most important detail to observe in maintaining a high quality of sound reproduction is cleanliness. The tiniest particles of dirt, lodged in any part of the apparatus, may have disturbing effects. More insidious trouble may arise from defective loudspeaker units. But attending to the serious defects in sound systems is only one phase of the sound engineer's job.

He may also be instrumental in obtaining finer over-all sound reproduction in a theatre where improvement was thought to be impossible—where architectural problems, for instance, hindered the efficient distribution of sound to all parts of the house. In such cases the sound engineer, through tests and manipulation, may adjust the sound mechanism to achieve proper balance of high and low frequencies as well as more uniform distribution of sound through the theatre.

Another phase of the sound engineer's function, while less dramatic, is immeasurably more important. This is the problem of guarding the sound quality against subtle, gradual degeneration—a degeneration that sets in by imperceptibly easy stages. Curiously enough, while the exhibitor may be well aware of the hazards of such deterioration, he must guard against trusting the judgment of his own ears. Open-minded exhibitors recognize this danger, and realize, furthermore, that the experienced, acutely analytical ear of the service engineer is a genuine safeguard to them in this matter. The sound engineer, who comes fresh from other theatres on his routine inspections, and whose ear has a yardstick of comparison, can detect the deterioration before it gains material headway.

By this time, it should be apparent that the job of servicing projection and sound equipment is far removed from the exhibitor's sphere of capability. This levels no indignity upon the exhibitor-manager. He should view his position as that of a hospital superintendent, and not the specialized surgeon. His is the job of efficiently managing the theatre—

SERVICING THE SOUND HEAD involves scientific precision and takes a trained technician to do it properly. While many projectionists may keep the apparatus in good condition, through routine maintenance and care, the delicate balance and adjustment of circuits and various items of equipment demand accurate testing and precise adjustments. Part of this technical know-how is the correct interpretation of meter readings. (RCA photograph.)



delegating specialized jobs to those most capable of executing them.

It would be almost ridiculous to mention the matter of cost in a consideration of equipment service. Striking a fairly general figure, the estimate on the cost of such service runs to approximately $.0073 per seat, per week. This cost is an infinitesimal part of the total weekly overhead.

Certainly, other factors are more worthy of consideration. First and foremost, the experience of the organization. Secondly, the staff, and thirdly, the policies, stated and observed.

Obviously, there are many ways to service theatre equipment. An organization may offer a minimum of service, merely performing the routine check-up and emergency services. Or it may go to the extreme of making recommendations, tailoring its service to individual needs, preparing the exhibitor for advances in the field of sound reproduction, particularly. Naturally, the foresighted exhibitor seeks the most complete service for his money.

But there are not many organizations that are equipped to deliver the type of guidance-service described here. Only an organization that operates on a nation-wide basis can bring to every exhibitor the accumulated experience gained from servicing thousands of houses. With such an organization servicing his equipment, it would not be the thinking or opinion of one man that determined the most efficient procedure in tending delicate equipment, but a combination of two important elements: The scientific findings of a research laboratory and the practical findings of the staff of engineers who service the many theatres on its roster.

Aside from the technical and experimental background of the organization, the exhibitor is wise to consider its policies. Are they impartial? Are they interested in obtaining the best possible results from his equipment regardless of the manufacture, and not only interested but capable of doing so?

It is encouraging to note that more and more exhibitors have come to recognize their responsibility in picture reproduction. Realizing that the producer can only put fine quality on the sound track, he assumes responsibility of reproducing, for his patrons, all the artistry recorded. But aside from the altruistic outlook, there are considerable dollar-and-cents values in the proper servicing and maintenance of theatre equipment. As long as the exhibitors of the nation accept the challenge thrown to them, and continue to uphold the quality of motion picture entertainment, the public will spend its money at the box-office—willingly and to their constant satisfaction.

A continuous training program is carried on among the field personnel of such a company to keep them currently informed as advances in the electronic arts are applied to theatre sound equipment. This training is under the supervision of the company's district managers, field supporters, and specialists in the various applications. New service methods are constantly being developed, and, as these are proven in actual field operation, the information is passed on to all of the company's service engineers. Out of the rapid advances made during war-time have come important, new techniques which are now being applied practically in the theatres.

Many service-company engineers were engaged in servicing radar and other advanced equipment for the armed forces during the war, and have kept abreast of television development. These men, as well as others trained at home, will be ready and qualified to handle the installation and service of theatre television equipment when it becomes available.

In addition, new test equipment developed as a result of urgent war needs is in the process of manufacture and will shortly be available to field personnel. All this adds up to more precise service methods and means that exhibitors will get greater value than ever for each service dollar spent.

No individual or local service engineer can hope to perform the specialized job which an organization, national in scope, can offer to exhibitors. Theatre owners have agreed, as evidenced by the thousands who have service agreements in effect, that a service company, with a highly trained field force and the resources of a national organization, is the best protection for their theatre investment.

THE SOUND APPARATUS is a highly specialized system, employing delicate electrical circuits, all of which require many accurate adjustments properly to reproduce the sound as it is recorded on the film. With such adjustments normally made at the time of installation, the equipment nevertheless requires regular attention to assure that adjustments are accurately maintained. The electronic parts are also subject to deterioration. (RCA photograph.)

JANITORIAL AND SANITARY SERVICES

For complete sanitary service in theatres, someone must be assigned to keep washrooms clean at all times. A porter in men's toilet rooms and a maid in women's is an ideal set-up. These people should be added to the theatre payroll, and must not expect to earn money by tips from patrons. They should see that toilet rooms are cleaned regularly and kept clean.

Another "must" is a small room or enclosure containing a service sink supplied with hot and cold water. The sink should be of ample size—at least 24 x 20 inches. This room should be provided with conveniences for hanging mops,

brooms, brushes, cleaning clothes, etc. There should also be a storage room (or a larger service room) for supplies such as toilet tissues, soap, and cleaning powders.

Now, as for the matter of disinfectants, if plumbing fixtures are designed for utmost sanitation and are kept clean, no special disinfectants are necessary. Normal disinfecting—washing and cleaning —will keep toilet rooms sanitary.

DETECTIVE AGENCIES

The helpfulness which a service institution can provide to management depends upon the experience and dependability, the skilfulness of its supervisory staff and the reliability of its operating personnel. The experience and skill of the service's supervisory staff enables it to comprehend the problem submitted and to devise the most efficient and economical plan for the determination of all essential facts.

Usually it is immaterial that the service institution has not previously engaged on an identical problem. No new problem is ever identical in all particulars with others before encountered, for there are always differences in individuals involved, their characteristics, location, surroundings, and the impulses and other pertinent influences.

Therefore, procedure on the part of the service organization can rarely be of a standardized type and, invariably, must be fitted to meet the special requirements of each problem. It is because of these ever-present factors what experience and dependable facilities are of vital importance in the selection of a service organization as an aid to management.

Management can be confident of the soundness of its judgment only when possessing accurate information of the constitution of each problem confronting it. Situations, in connection with which all ingredients are known to management, or are easily obtainable through routine inquiry, of course, present no problem. It is the mysterious single evildoer or a complex combination of circumstances, the causes and composition of which are hidden from normal vision of management, that create actual problems. It is in the solution and efficient handling of these latter problems that management requires accurate information upon which to make sound judgment.

A private detective agency is not generally known for its activities in the commercial field, and particularly the valuable services rendered to theatres throughout the country. Yet many of nationally-known concerns, including theatres and major motion-picture companies, utilize such crime prevention services.

In theatre management, the main problems, as in many other fields, are those involving protection of the revenue.

Protection of revenue commences with the selection of employes, and prudent management undertakes to ascertain that all the applicant's previous employment performance and his method of living are such as favorably to commend him for the position he seeks. The scope of such investigation would be determined by the degree of trust and responsibility which would be the employe's. Some agencies have an employment record card which embraces the past record and complete data of the employe or applicant.

The greatest loss of revenue doubtlessly occurs through dishonest practices by ticket sellers and ticket takers and through false entries by dishonest local managers. Usually management has anticipated such losses through these channels and has adopted working rules and checks designed to prevent them. Such rules and checks are effectual only when fully observed. To assure of invariable compliance with such rules and to receive the contemplated value of the checks established, there needs to be competent and regular inspection, unknown to the employes concerned, of individual performance. This service, commonly referred to as testing or checking, is performed by representatives of the service company operating as ordinary patrons; or by others who count (clock) patrons purchasing tickets between hours which can later be checked with the box-office report.

A number of theatres and theatre circuits engage this type of service for checking all angles of efficiency, honesty, and courtesy of employes, condition of various lounges, parcel room, and rest rooms.

In other cases, a special secret service is furnished by using operatives as a regular employe, such as cashier, doorman, usher, or assistant manager. The confidential information secured in this manner is most valuable to clients. Clients are also served by clocking attendance, indicating the exact number of persons admitted during certain hours.

In many cases, detective agencies are engaged to place a certain employe under surveillance, in order to ascertain just how he spends his time during and after business hours, his associates, habits, expenditures, and so forth.

After the end of employment, it has been found advisable in businesses employing in positions of trust and responsibility persons whose performance might induce or discourage patronage, to inquire into the manner of individual performance, periodically and with regularity, to ascertain if the system adopted for the security of the business is being maintained or if laxity in this or other improper practices have begun.

Activities such as embezzlement and thefts by individual employes, conspiracies to defraud, property depredation, hold-up, robbery, and burglary are crimes which should be promptly investigated, and the offenders speedily detected and brought to justice.

Investment in the services of a private detective agency to investigate crimes of this sort and to cooperate with the peace authorities for the successful prosecution of the guilty pays large dividends in the warning thus given that such offenses against the affected business will be speedily and energetically investigated and the offenders relentlessly prosecuted.

Such service consists in part of the display of metal protective signs at such strategic locations as box office, doors, lobby, check room, lounge rooms, and employes' locker rooms. These signs daily informing all employes and the general public that such theatres are protected create a psychological effect which cannot be over-emphasized, and act as a definite deterrent against all types of crimes, losses, dishonest acts, and other irregularities.

A number of theatres regularly use uniformed guards, or special officers, for protection purposes, as well as for the psychological effects. This is particularly true in theatres sometimes fre-

WITH PROPER ATTENTION on the part of assigned personnel, janitorial and sanitary service from outside sources is reduced to a minimum, although there are companies which will take over all this work. In extermination activities, on the other hand, the careful theatre owner will employ specially trained, commercial men of proved integrity. Thoroughness of the work and the use of proper chemicals is thus assurred. (Fort-A-Cide photograph.)

FORM 178 REV.

EMPLOYEE RECORD No.

Applicants for positions with this company must be willing to have their past record and references checked by

THE WILLIAM J. BURNS INTERNATIONAL DETECTIVE AGENCY

This organization and its employees are under the protection of the above named Agency.

Name		
Street	City	State
Telephone		Social Security No.
Date and Place of Birth		Married
Age	Height	Weight
Eyes	Hair	Complexion
Trade or Profession		U. S. Citizen
Former Occupation		
Last Employer		What Was Your Salary?
Are You Still Employed?		In What Capacity?
By Whom Employed?		At What Salary?
Are You Bonded?	Have You Ever Been Refused a Bond?	

(OVER)

Have You Ever Been Complained Of, Indicted For or Convicted of Any Violation of the Law or Ordinance?

If So, (Give Details)

LIST PAST EMPLOYERS		EMPLOYED	
NAME	ADDRESS	FROM	TO

PERSONAL REFERENCES (Do Not Give Relatives)

NAME	ADDRESS	BUSINESS

.....19..... Employers:

Date Mail This Card to Signature of Applicant

THE WILLIAM J. BURNS INTERNATIONAL DETECTIVE AGENCY

TYPICAL OF THE PERSONNEL INVESTIGATION made by private detective agencies is this card form used by the William J. Burns International Detective Agency (reproduced here by courtesy of the company). From the data obtained on this form, the whole past personal and employment history of the prospective employe is placed in the hands of the theatre manager or the organization's personnel officer. Thus the decision to hire or not can be made quite dispassionately and strictly on the merits of each individual case. Besides property protection, other services of these companies include checking box offices and crime prevention.

quented by individuals liable to cause disturbances, and thus affect the reputation and patronage of the theatre.

In addition to various investigations, certain recommendations are made to clients for the purpose of reducing losses and irregularities to a minimum. For instance, one large theatre has declined to accept ladies' furs and fur coats for checking. Notwithstanding this rule, occasionally a claim is made for the loss of a fur coat, which readily shows that a false claim is being made.

All personal injury accidents occurring upon the premises, notwithstanding public liability insurance coverage, when promptly investigated by a competent service organization will reveal where there has been carelessness or neglect by an employe, if the cause of the injury is as alleged, and what proper measures are possible to prevent recurrence. Such investigation, conducted by the direction of management, serves to maintain alertness on the part of all employes functioning within the same or similar circumstances.

Thus do agencies come within the category of "service companies." As a rule, they operate on the basis of a per diem charge for each representative (operative) assigned, plus the necessary expenses actually incurred. No charges are made for consultation in agency-office cities, since their purpose is to encourage management having perplexing problems to consult experienced officials in order that, where agency facilities are adaptable to the solution of the problem, an application can be offered. By virtue of long and extensive experience in dealing with crimes perpetuated by both professional and amateur criminals, detective agencies are in a position advantageously to serve America's theatres.

POLICE AND FIRE DEPARTMENTS

The police departments in every American city encourage theatre managers to utilize all the services rendered by the police. In many cities these include two-way radio patrol cars; emergency patrol cars, which are constructed for either patrol or ambulance work; the mounted policemen, who may prove invaluable particularly in the central part of the city; the foot-traffic policemen; the detective force, which makes special investigations mainly inside theatres; and all the other specialized units which assist in safeguarding life and property.

In emergencies, policemen in radio patrol cars or on foot, when requested by a theatre manager, will, when he is conveying large sums of money, accompany him to the bank. However, several concerns are engaged in the business of conveying money to and from banks in armored cars manned by armed guards. In many cases, theatres have contracts with such firms.

Policemen, those in the central section, as well as in the outlying areas, generally carry on them information on the location of theatres, so they may direct inquiring citizens.

When shows draw huge crowds, which necessitate people standing in long lines to purchase tickets, police are assigned to keep order, prevent confusion, and arrange orderly procession to the ticket window.

The police are not for a moment unmindful of the dangers resulting from theatre fires, and are constantly instructed to prohibit parking in restricted areas in the vicinity of theatres, so that fire apparatus may enter without difficulty.

Theatre managers are usually informed of the police department's telephone number, so that in case of disorder, crime or other violations, police may be immediately summoned.

Radio patrol cars will generally reach any location to which directed within less than three minutes, and many times within seconds, after receiving the call.

Theatre management can be assured that the nation's police departments are prepared to render assistance in any police problems which may arise.

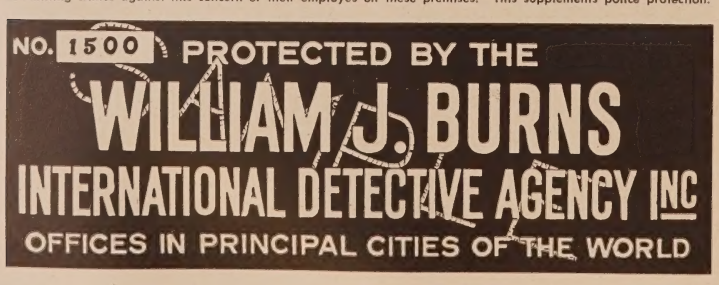
Services given to theatres by members of fire departments are, of course, for the protection of the public.

Other than the regulated services, firemen can be of service in suggesting ways of easing crowded conditions and manner of having patrons wait for seats; suggestions to the management to check heating systems before cold weather sets in and to check the ventilating systems before the warm weather arrives and to correct all defects; and in arranging instruction to theatre staffs on the procedures of fire-prevention, courses of action in emergencies, and operation of various types of fire-fighting equipment.

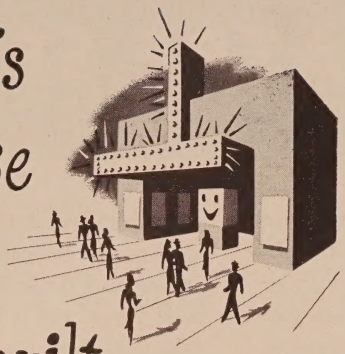
The most important suggestion is for the strict supervision of smoking at the termination of the show, to prevent the discarding of lighted matches or cigarettes on the carpet, and so forth.

As most of the fire department's work is regulated, there is not too much extra that can be offered in the way of "service." But it should always be remembered that the fire department, like the police department, is in the business to serve and to protect. When questions arise, it is a mark of managerial incompetence not to seek the best information from the known authorities.

POSTING OF PROPERTY as a deterrent on the commission of crimes is a part of the work of such companies as the William J. Burns International Detective Agency, through whose courtesy this sample is reproduced. Another form includes the statement, "A liberal reward for information leading to arrest and conviction of any persons committing crimes against this concern or their employes on these premises." This supplements police protection.

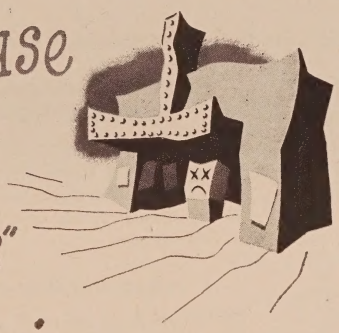


this is the house that "Jack" built...



We've seen them bigger; we've seen them smaller, too. Yes, whatever the size, we've seen you pour good hard cash into it every year — for grade A billings and advertising; for carpet cleaning and furniture repairs. And today, you've got something . . . a showplace . . . an entertainment center.

...the house the "willies" can ruin



But how much of your minted coin do you plunk down to protect that investment? How much do you set aside to offset equipment problems — only will-o'-the-wisps, maybe, that crop up once in a while, but stay long enough to do their damage? And when you book a million-dollar production, do you give any dollars-and-cents thought to your sound equipment that's supposed to carry the show?

Yes, Mr. Exhibitor, we're talking equipment service—and suggesting the best, Altec. We've no corner on sound engineers and technicians, but twenty years of research and engineering have brought together, in one organization, a giant share of the specialists in the field. Think! For an annual outlay that is only a fraction of your decorating expenditure, those brains and specialized skill can go to work as bodyguards for your equipment.

WHICH OF THESE SERVICES MEETS YOUR NEEDS?

STRAIGHT SERVICE CONTRACT

This contract entitles you to thorough periodic check-ups on equipment as well as emergency service for unexpected breakdowns.

SOUND REPAIR AND REPLACEMENT

Double protection . . . this contract includes all the features of straight service plus repair and replacement of sound equipment parts.

BOOTH REPAIR AND REPLACEMENT

An all-inclusive service for booth and sound equipment. It includes straight service and repair and replacement of booth and sound parts.

ALTEC
SERVICE CORPORATION
250 WEST 57th STREET
NEW YORK 19, N. Y.

BRANCH OFFICES IN: PHILADELPHIA, BOSTON, ATLANTA, CHICAGO, CINCINNATI, DETROIT, KANSAS CITY, LOS ANGELES, NEWARK, BALTIMORE, NEW ORLEANS, DALLAS, CLEVELAND, PITTSBURGH, MINNEAPOLIS, DENVER, SAN FRANCISCO, SEATTLE, PORTLAND, ORE.

RCA THEATRE SERVICE

Preserve your equipment—keep it at maximum operating efficiency with RCA Service. RCA's nationwide service organization is well equipped to keep your equipment operating at peak performance. With a large staff of trained, experienced Field Engineers, plus the backing of the largest research and engineering development group in sound, radio, and the allied arts, RCA Service will help you solve your problems, whether they apply to sound systems, public address equipment, acoustics, projection, radio or television.

Only RCA Service offers you these outstanding features:

FREQUENT SCHEDULE EQUIPMENT INSPECTIONS

Scheduled inspections of your sound equipment will be made, insuring peak performance and long life—preventing box office loss. Thousands of theatre exhibitors employ RCA contract service at surprisingly low cost.

PROMPT EMERGENCY SERVICE

RCA emergency service means quick action when you need it—and because RCA Field Engineers have wide experience, trouble can be isolated and corrected in the shortest time.

SOUND AND PROJECTION PARTS

RCA looked ahead, and is therefore prepared to more completely fill your parts needs. To further insure long equipment life, contract for the RCA plan which provides the furnishing of parts and tubes at a small yearly cost.

LABORATORY, ENGINEERING AND MANUFACTURING COORDINATION

Only RCA designs, manufactures, sells, installs and services theatre sound systems. The RCA service organization therefore benefits from broad fields of experience, and is in a better position to solve your problems.

PROJECTION ENGINEERING SERVICE

RCA Field Engineers will at any time be glad to discuss with you problems relating to your projection equipment. Their experience enables them to offer you valuable advice.

ACOUSTIC ENGINEERING SERVICE

If you have acoustic problems in your theatre, ask your RCA Field Engineer's advice. He can help you, and if complex situations exist, he has access to the RCA staff of acoustic engineering experts.

EMERGENCY PORTABLE SOUND SYSTEM

The RCA emergency portable system is employed in many theatres. Ready for use in a few minutes, it is an extra safeguard for your sound. It reduces still further the possibility of sound outages.

For more information about RCA Service ask your nearest RCA Service representative or write RCA Service Company, Inc., Camden, N. J.

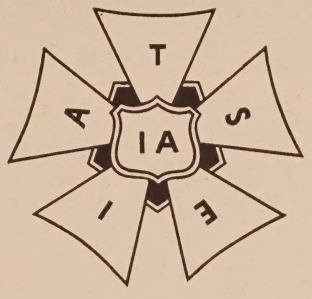
RCA SERVICE COMPANY, INC.

A RADIO CORPORATION OF AMERICA SUBSIDIARY

CAMDEN, N. J.

INTERNATIONAL ALLIANCE *of* THEATRICAL STAGE EMPLOYEES and MOVING PICTURE MACHINE OPERATORS of the UNITED STATES and CANADA

Affiliated with the American Federation of Labor



RICHARD F. WALSH
International President

WILLIAM P. RAOUL
General Secretary-Treasurer

Suite 803, International Building
630 Fifth Avenue
New York 20, New York

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(A division of Ross Federal Service)

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Permanent offices in 32 cities, plus a trained field staff of more than 5,000 men.

Know your market before you start to sell. Know your market for new products. Know your market and know your sales possibilities.

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NEW YORK CITY

E. W. HAMMONS
President

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Chairman of the Board

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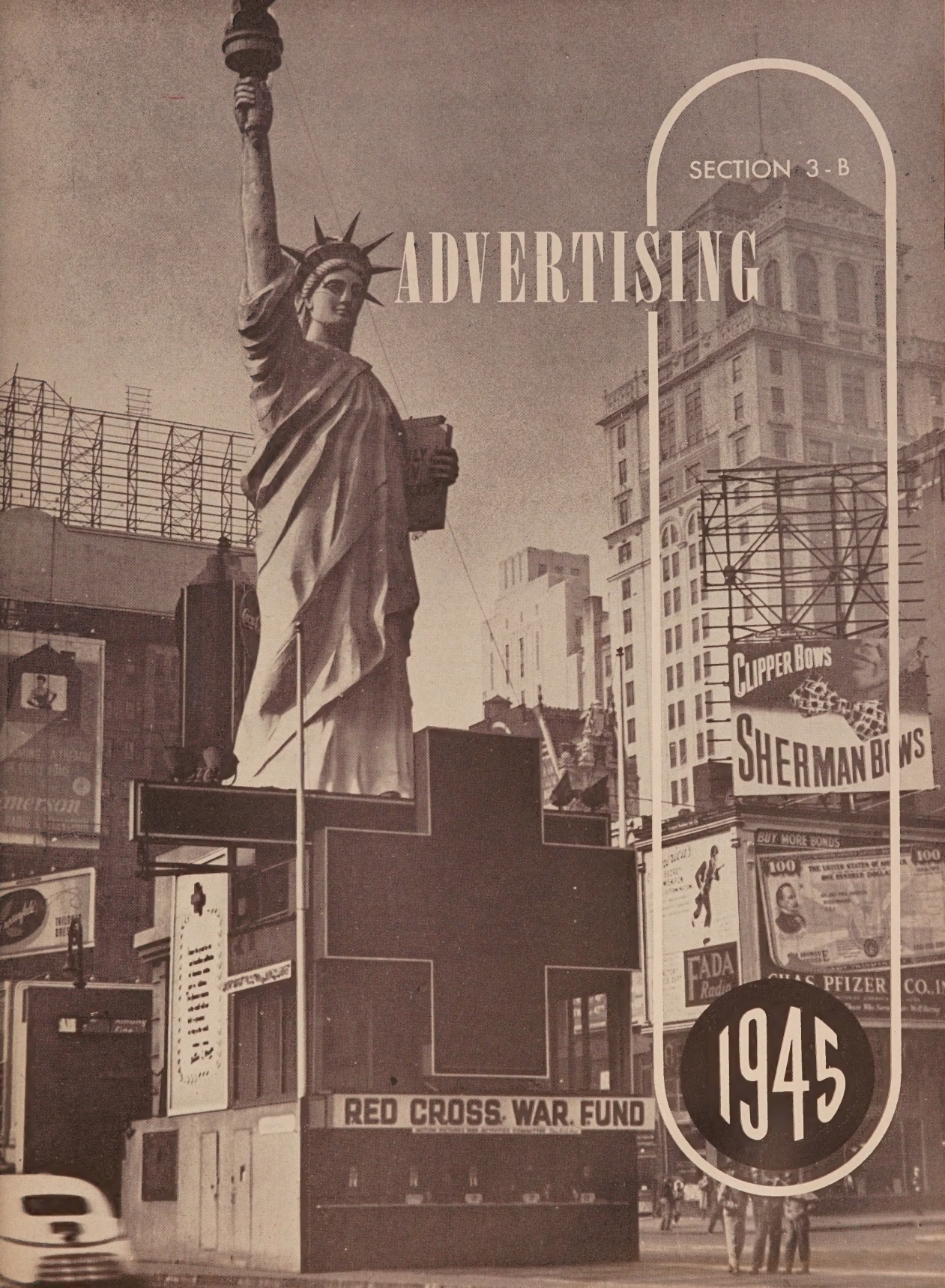
HONDURAS	ECUADOR	VENEZUELA	DOMINICAN REPUBLIC
COSTA RICA	PERU	TRINIDAD B. W. I.	CUBA


SECTION 3 - B
ADVERTISING
CLIPPER BOWS
SHERMAN BOWS
BUY MORE BONDS
RED CROSS WAR FUND
1945

Modern Theatre: Setting for Showmanship

The Specialty Accessories Now Available Emphasize Points-of-Contact Advertising

By Melvin L. Gold
Director of Advertising and Publicity, National Screen Service Corporation

Design for the modern theatre is essentially based on the parent blueprint for increasing theatre patronage and continuing that patronage once it is attained. Accordingly, while suitable accommodations for the convenience of patrons are amply provided, and beauty and motif are given every consideration, the show-wise theatre designer stresses effective display of advertising, in front and lobby, as primary factors in the successful planning of new or improved theatre construction.

For this purpose, there has been available for many years—and the supply continues to increase and enhance—a wide variety of colorful and artistically designed advertising displays which lend the "magic touch of showmanship" to the most modern theatre, while proving equally effective in luring patrons to those theatres where the creative touch of the modern theatre designer has not as yet been felt.

POINT-OF-CONTACT ADVERTISING

Space, size, and design of the front or lobby usually dictate the type of display to be used. Although these displays have become standardized as to size and shape, their versatile usefulness, as well as the wide choice of types of displays, allows for their adaptation to almost any plan for theatre modernization.

Framed Displays

In fullest appreciation of the value of point-of-contact advertising, the modern theatre frames are designed, in most cases, to accommodate displays, 40 x 60 inches in size. Many frames accommodate even larger display arrangements, whereby a 40 x 60 is used in combination with standard lithographed accessories. Accordingly, with the exception of banners, with which we shall deal later, most specialty accessories—comprising those colorful displays employing the use of poster colors, applied through a highly effective silk-screen medium, photo-art, cutouts, transparencies, and specially appliqued treatments—are prepared in the 40 x 60 size.

Many theatres, faced with a lack of space in lobby, or front, or both, find it impossible to accommodate the 40 x 60 frames, and, for their purpose, several styles of specialty accessories are prepared in the smaller, 30 x 40-inch size. Frequently, exhibitors have found it advantageous to combine in one frame, originally designed to accommodate one 40 x 60, a combination of a 30 x 40 display and 11 x 14 photos or stills.

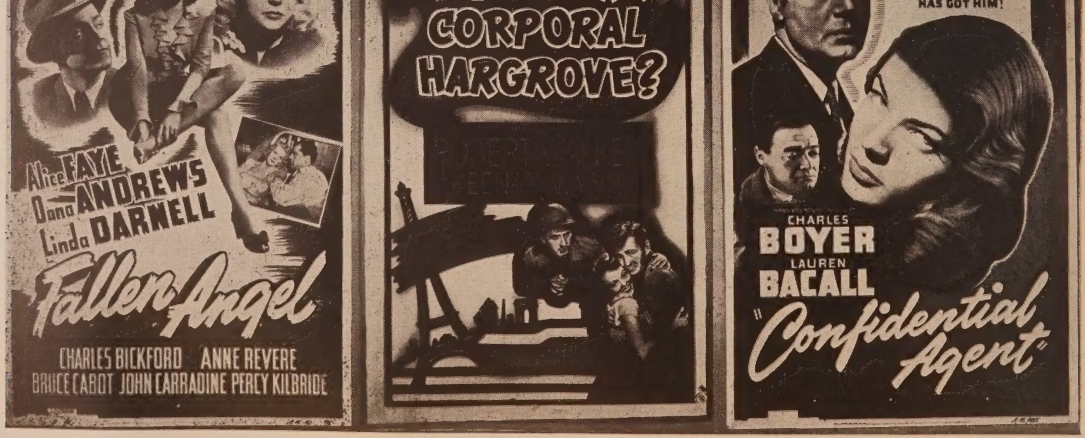
Front-Lighted Displays—Where the theatre has been designed with shallow display cases that do not allow for the inclusion of lighting facilities within the case, or where the design of the case necessitates front-lighting of the poster, a very popular display piece is generally used, employing the combination of silk-screen process in many colors and usually with reproductions of photos of stars and scenes, done in the modern photo-gelatin process known as Photo-Art. These displays are inexpensive, and are available in both the 40 x 60 and 30 x 40 sizes. Suitable for use in the theatre lobby and front, these accessories are compatible with the most modern innovations in theatre planning, and provide eye-arresting effectiveness against the modern simplicity of the current motif in lobby and front design.

The latest innovation in this type of accessory is just beginning to make its appearance in the form of Colorart posters, wherein silk-screen process is combined with Photo-art in natural colors. This new, colorful poster possesses a beautiful, life-like appearance that sets a new high in eye-appeal through color harmony. Economically priced, it offers a de luxe advertising medium at very nominal cost. These powerful displays are available in both 40 x 60 and 30 x 40 sizes.

PHOTO-ART DISPLAYS, in both 30x40 and 40x60, employ a combination of multicolored silk-screen process and photographs of stars. It is used in shallow display cases where front lighting is quite essential.

NEO-ART DISPLAYS combine dignity with superlative showmanship, providing colorful backgrounds with a neon like effect. This type of display is individually produced because of the hand work that is required.

COLORART POSTERS utilize both the silk-screen and Photo-Art in natural colors to set a new high in eye appeal. In both 30x40 and 40x60, and economically priced, the posters offer a deluxe advertising medium.



Back-Lighted Displays—Where display cases are sufficiently deep to allow for the inclusion of electrical facilities for back-lighting, several types of beautiful displays is adaptable to dimly-lighted lobbies and foyers, where it is desirable that all light emanate from behind the display; or in well-lighted lobbies, foyers or theatre fronts, where the double effectiveness of back-lighting and front-lighting is desired.

In the category of special accessories suitable for back-lighting are several items.

Transparencies are multi-colored 40 x 60 display pieces which are completely transparent. The carefully blended colors are intensified as the light passes through them, giving unusual effectiveness in dim lobby or brilliantly lighted front. Embodying every facility for selling the show, these displays afford selected lighting of lobby and foyer without impairing the value of the advertising.

Hollywood Specials are 40 x 60 cut-out displays, backed with transparent paper, and attain added effectiveness through the use of Photo-Art of stars and scenes. The addition of Colorart to the Photo-Art sections is currently enhancing this colorful production. Light, passing through the lifelike Colorart photos, produces a realistic effect, adding distinction to this piece and power to its selling job.

Neo-Art is the aristocrat of lobby advertising. Adaptable to lobby or front, this creation combines dignity with superlative showmanship. A sturdy, colorful, 40 x 60 cutout display, Neo-Art embodies transparent Colorart life-likeness with carefully blended color-backgrounds and is ingeniously lighted to create a patented neon-like effect, as well as carefully planned sprays of light which enhance the three-dimensional appearance. This display is truly a theatrical production which gains added beauty and emphasis through well-planned lighting effects.

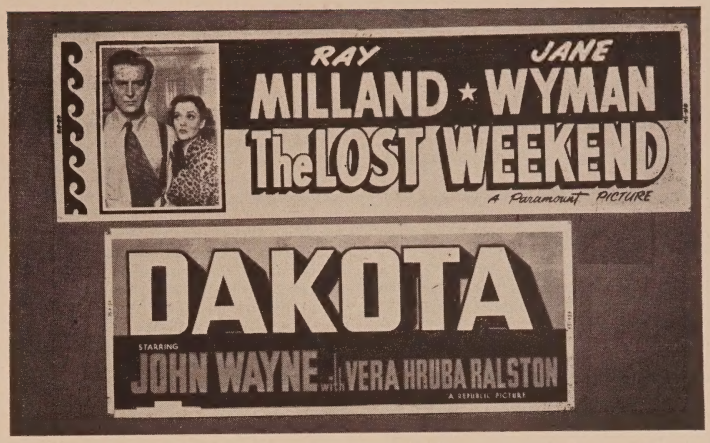
Neo-Art displays are individually produced; their carefully hand-appliqued sections precluding the use of mass-production methods. Unsurpassed in beauty, dignity, and selling-power, they represent the greatest advancement in theatre-display advertising known to the motion-picture theatre.

Standing Frames

In addition to the uses in standard 40 x 60 wall frames in lobby or front, the aforementioned group of custom-built accessories are especially adaptable for use in special frames located in dimly lighted corners of the lobby, foyer, staircase landings, and other vantage points, where standing frames may be placed at will, and where an otherwise unused, bare spot might be employed to do an outstanding selling-job. No modern theatre is complete unless it has availed itself of this advanced medium of display advertising.

Another deluxe style of display, available in both 30 x 40 and 40 x 60 sizes, is the Special, individually produced with air-brushed colors, flittered cutout titles, and appliqued star-heads, all mounted on heavy board. Forceful, individually designed creations, these efforts of master craftsmen are intended exclusively for front-lighting. This display provides a fine, potent selling-piece, which adds stature to the production it advertises.

Available on a rental plan, added economy and effectiveness are derived from the use of these display pieces in the foyer, then moving them to the lobby as the play date draws near, and finally, utilizing them as displays for the current attraction in the theatre front.



BANNERS, 24x60 and 24x82, provide sizable display of titles and cast in all overhead spaces on walls, staircases, and entrances in the foyer, lobby, and front. Offering the combined advantages of size and color, banners are easily seen and their bold display of title and cast easily assimilated. They are ideal for such spaces in the theatre which lack the requisite vertical area needed by the usual displays but are sufficiently wide.

Banners

Overhead spaces on walls, staircases, and entrances in foyer, lobby and front may be converted into potent, point-of-contact advertising media, through the use of colorful banners. Available in 24 x 60- and 24 x 82-inch sizes, banners provide bold, sizeable display of title and cast to catch the eye of patrons hurrying in or out of the theatre, up close or at a distance.

Offering the combined advantages of size and color, banners are easily seen and their bold display of title and cast, easily assimilated. They are ideal for

HOLLYWOOD 40x60 DISPLAYS show the combined effectiveness of front lighting and back lighting for lobbies and foyers. Here the display is in a standing frame, but it is equally adaptable to wall frames.

TRANSPARENCIES prove effective in dark foyers or unlighted corners, as shown here, where the display is solely back-lighted. This poster is also used with equal effectiveness in the back-lighted wall frames.

spaces which lack sufficient vertical area for 40 x 60 displays, but do provide for plenty of width. In such cases, the banner actually enhances the motif by providing, in addition to its seat-selling value, a pleasing balance to the planned arrangement of advertising display layout.

The 24 x 60 banner is devoted entirely to title and cast, sometimes including a "catch-line." The 24 x 82 banner has added to the bold display of title and cast, a Photo-Art reproduction of one or more of the stars from the picture.

Frames are frequently prepared in a larger size, to accommodate either the 24 x 60 or the 24 x 82 banner, plus 24 x 24 daters and 24 x 24 second feature banners.

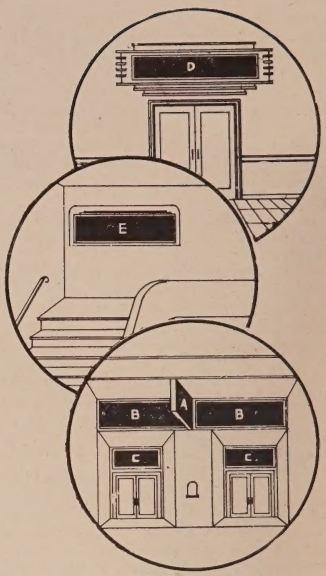
Banners are especially adaptable to the remodeling of theatres, whereby old-fashioned transoms over doors may be converted into beautiful lighted coves to accommodate banners, or, even more economically, may be covered by banners. They also serve an ideal purpose over doorways in high-ceilinged lobbies and foyers, by providing added advertising display and cutting down the optical height of the walls.

Standees

Dating back to the old-fashioned method of mounting and cutting out 3-sheets and 6-sheets to provide easel displays for lobby and foyer, the standee, modern version of this versatile, showmanlike display, has gained tremendous popularity in the modern theatre. Specially prepared to provide an optical change-of-pace, through its cut-out design, the standee accentuates star value and adds an extra selling-facet to the display campaign. Artistically produced in several beautiful colors, power and drama are ingeniously woven into the craftsmanlike composition of this unusual advertising medium.

Approximately 5 feet high and 3 feet wide, this cut-out, silk-screen-processed display fits into a simple, sturdy easel, which avoids "framing" the display, while at the same time providing adequate solidity. Easy to assemble and easy to move around, standees gain effectiveness through their adaptability to awkward corners on landings, in front of the theatre, in the lobby, near the doorman, or practically anywhere that adds to the point-of-contact possibilities between patron and display.

The standee looks unlike any other display in your theatre, because it is cut out, and unframed! It is so totally different that it adds showmanship and interest to the lobby, foyer, or front. Available on a rental basis on all big pictures, standees are low in price, and a logical advertising medium for any theatre.



SUGGESTIONS for banners include (A) swing, (B) front overhead, and (C) transom banners for outside display, and (D) over doors and (E) stairs and walls within the theatre. Banners may be reasonably rented.

STANDEES show effective cut-out designs which give startling effectiveness. Standees created for serials are purchased outright for use throughout the run of the serial and is adaptable to otherwise unused corners, staircase landings, up in front of the theatre, or any place where this colorful point-of-contact advertising can do the most good. Standees for use in connection with the regular runs may be rented at a nominal charge.

SPECIALTY ACCESSORIES

The colorful beauty of specialty accessories, in addition to providing highly-profitable point-of-contact advertising, also offers desirable relief from the severity of modern design. Against the dignified elegance of wood-veneers, Formica, tile, or other decorative media, specialty accessories provide the glow of showmanship, without which the motion-picture theatre loses its identity, and the increased patronage justifies the extensive remodeling or lavish design of the theatre.

Advertising displays should be made the nucleus of theatre design. Plan around the displays, that they might be enhanced and, in turn, enhance the effectiveness of your blue-print for sales. That the modern theatre may achieve its purpose in bringing new patrons and, at the same time, urge your old patrons to return, it must be a setting for showmanship!

Unusual Uses for the Usual Accessories

Interesting Variations Will Be Obtained By Combination of Several Standard Items

By VINCENT TROTTA
Art Director, National Screen Service Corporation

Many exhibitors seem to feel that the present sizes of standard items are stationary and can only be used as such. They feel that a 24-sheet stand has to be used for such and for no other purpose. The same applies to a 6-sheet, a 3-sheet, and a 1-sheet.

Were I an exhibitor, I could let all these items speak a different language for my theatre. I would really make the most use of them the same as a shrewd buyer could make the most use out of his investment. A point of issue would be that, if an exhibitor has a 3-sheet stand in his lobby or outside, and does not like the 3-sheet the distributor has prepared for him, he feels that he should not buy this, and prepares a home-made placard which he thinks can fill his need, to be placed in that 3-sheet stand.

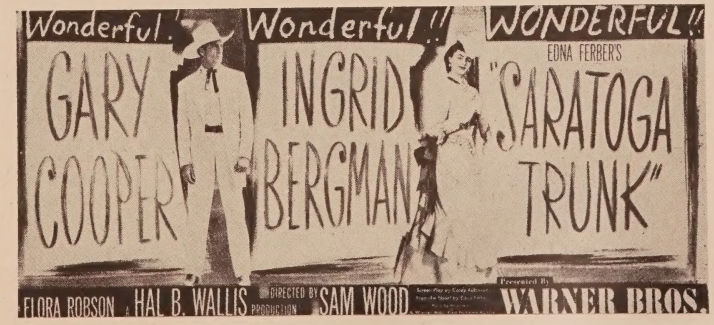
To my way of thinking, this is really very short-sighted. Giving credit to that exhibitor, that the 3-sheet he does not like to use in advertising a produc-

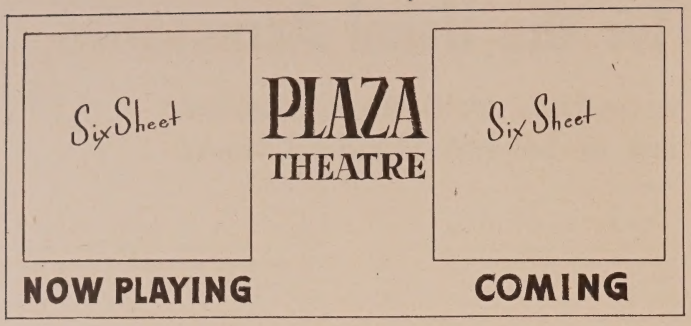
ALL TOO FREQUENTLY, theatre advertising and publicity men get the idea that the available material on a picture has to be used in the precise manner indicated by the nature of the accessory: that, for example, 3-sheets and 6-sheets must, of necessity, be used only in frames or on boards designed to take these special types of billing. But it frequently happens that the particular accessories available are not especially suitable either for the theatre or its run. This does not mean, of course, that 6-sheet and 24-sheet boards become valueless. Indeed, it might be that by doubling up as suggested here, even more effective displays might be arranged. As examples of the sort of material discussed in the present article, there is presented on this page samples of the 3-sheet, 6-sheet, and 24-sheet prepared by Warner Bros. for use in connection with showing of "Saratoga Trunk," starring Gary Cooper and Ingrid Bergman. Presentation of this material here is through the cooperation and courtesy of Don Carle Gillette and the Warner Brothers Distributing Corp.

STANDARD 3-SHEET

STANDARD 6-SHEET

STANDARD 24-SHEET





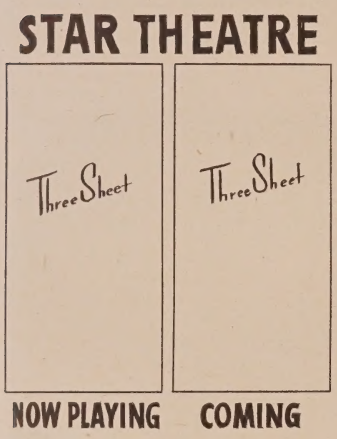
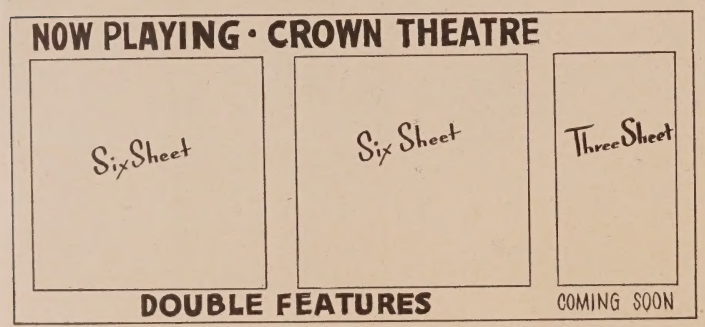


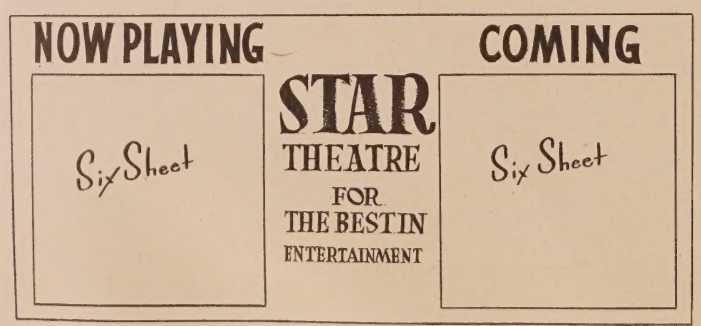
FIGURE 1.—Above is the simplest form of utilizing two 6-sheets on a 24-sheet board for the advertising of the current attraction and a coming one, either the next in line or one booked for a later date.

FIGURE 2.—Utilization of two 3-sheets posted on one 6-sheet board is shown to the left. Here, as is shown in Figure 1, a present and a future attraction is proclaimed to the theatre's potential customers.

FIGURE 3.—A method for treating double features, and even proclaiming a future attraction, is shown immediately below. Six-sheets on the current bill and a three sheet on one coming makes for, perhaps, the best use of all the space of a 24-sheet board.

FIGURE 4.—Comparable with Figure 1, the drawing at the bottom of the page shows a use of 6-sheets for advertising present and coming attractions, with the stand embellished further by special art work and slogan separating the two posters. These suggestions can also be applied to the present engagements of double features. All drawings on this page have been prepared by and used through the cooperation of the author and National Screen Service.





tion is not suitable, what would prevent his using a 1-sheet in that 3-sheet stand? He could dress the otherwise blank space on the stand with a group of 8 x 10 photos or a 22 x 28 lobby piece on the same production, together with the display copy in between the 1-sheet at the top and the 22 x 28 at the bottom.

The same thing applies to 6-sheet stands. If the 6-sheet available at the exchange is not suitable, he could use a 3-sheet on his present program and a 3-sheet of a coming production, such as s shown in Figure 2.

Some time ago, the advertising director of one of the circuit houses in Kansas City was asked by his New York office why he did not use one of the prepared mats instead of making up his own advertising material at a tremendous expense to his firm. He replied that the 4-column mat available from the producers for the production in question was not suited to his needs, either in size or in illustration. Accordingly, he made up his own layout from other material shown in the press book and had hits cuts made.

The matter was presented to me as art director of the film company at that time. In writing to that advertising director, I showed him how he could have re-vamped for any size that he wanted a mat available to him. It was proved that a wise exhibitor could take a 7-column mat, if he so desired, and cut it up for a 1-column usage.

In view of this I advance the suggestion that the same thing could apply for standard accessories.

If the exhibitor has a 24-sheet stand on the wall of his theatre or on a regular display stand along the highway, and he has a double feature or wants to advertise a present and a coming attraction on that stand, he could use two 6-sheets, one on each side of the stand, and some display copy, which he could have made locally at nominal cost. (Figure 1).

Or he could use two 6-sheets of a double feature that the exhibitor has on his screen with the 3-sheet of a coming attraction alongside of it such as Diagram (Figure 3).

Or he might use a "Now Playing" and "Coming" 6-sheet with the name of the theatre in the center (Figure 4).

Some of these methods have been used in scattered spots, but if exhibitors everywhere would take a little more time in nursing their standard accessories along, I am sure that their investment would be profitable to them. Exhibitors should take a pointed lesson in the use of advertising material put out by the electric appliance companies, the Coca Cola people, and the drugstores, whose retailers go to town in securing advertising material and making good use of it in their windows, from the Triple A stores, comparable with the first-class runs, down to the neighborhood stores, comparable to subsequent houses. In this post-war era, when there will be many new items, such as Plexiglas, Lucite, and other plastics, a vast field will be opening in their use to promote better results in displaying not only standard accessories, but any other material which exhibitors may purchase.

Role of Out-Size Displays in Advertising

Big Pictures, Long Runs Require Signwork Especially Designed for Big-Time Selling

By MELVIN STARR
Secretary, Artkraft Strauss Sign Corporation

If you were to ask Jake Starr, Broadway's Lamplighter, why the Broadway houses put up such tremendous spectacular signs, he probably would answer "Good pictures deserve them, the others need them."

After spending hundreds of thousands of dollars to produce a picture, more thousands to promote it, and then failing to decorate the house so that it could continue to carry out the impression which has been created, would be similar to trying to whistle a symphony: the art is there, the work is done, but the completeness is missing.

Those glittering spectaculars are not there merely to bemuse and amaze. They represent practical, hard-headed business sense and down-to-earth reasoning. Signs are the life-blood of motion pictures. They determine, very often, the length of a picture's existence in the market, from its opening on Broadway on down the line through general distribution.

One of the greatest reasons for Broadway promotion is to build up a healthy long run to help the distributors. The more people flock to see a picture, the longer it will remain on Broadway. The longer it remains on Broadway, the greater the likelihood of its stay in each of the smaller houses on the Main Streets of big towns, small towns, and hamlets throughout the nation. "Direct from a smashing 10-week run on Broadway" has to be substantiated. If it has been on Broadway that long, it must be good. They must see it; they have been wanting to see it; and it is the job of the Broadway sign to get people to see that picture when it first opens—and to keep them coming.

The film producers have long since taken a leaf (or vice versa) from the copy books of the merchandising men, "Package your merchandise attractively." The theatre, the display, the decor are all part of the package in which the entertainment comes. The sign that will most aptly describe the picture and that will most readily sell it to its potential audience is the point of sale advertising.

If the picture has an unusual story to tell, a strange adventure to relate, a stirring war drama to bring home, an escapist and amusing comedy to present, the sign the promoter buys must relay that. If it is a story on which he has spent millions of dollars and thousands of hours and a picture in which he has used the cream of Hollywood stars, that sign must convey all that. But that sign must tell its story not blatantly or dully, but subtly, attractively and in a manner to stimulate the desire of those who see the sign to see the picture.

Broadway itself has a certain amount of enchantment. The cumulative effect of a million electric-light bulbs, miles of neon tubing, flashing, dimming, dancing, all go together to make this particular avenue different, more exciting from any other street on the face of the earth. A blank bulletin above a theatre, a reticent marquee, would be like Jonah and the whale.

It would be very strange if a motion picture were to open unheralded in a Broadway house. It would be an outstanding departure from Broadway tradition, but would bring no outstanding results, for, in the glare and blaze of neighborhood signs, its obscurity would prove fatal. The chances are it would neither be seen nor heard of, and disappear as quietly as it appeared, for Broadway signs have become a tradition.

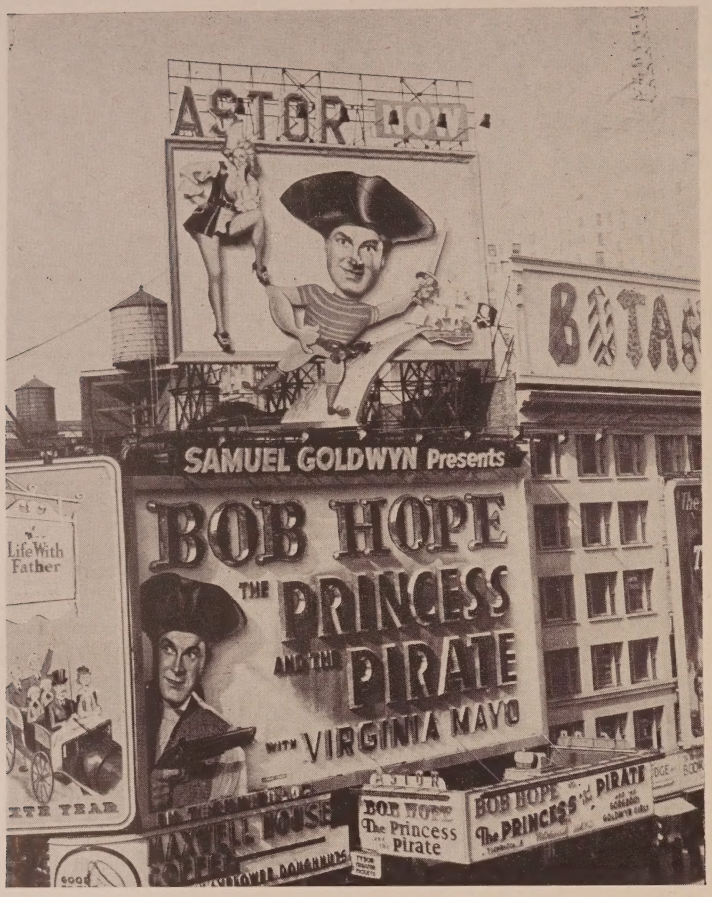
The signs on Broadway are Broadway. Spectaculars, flashing lamps, and neons are expected of Broadway, and Broadway obliges and happily lives up to its tradition. And as Broadway has its colorful array of signs, so each house on Broadway has its characteristic sign-display—some in blazing combinations of every conceivable device in sign-display.

The Artkraft Strauss Sign Corporation has been in business since 1897, making the spectacular signs which have made Broadway famous. Prior to World War II, the accent of course was on electricks. Each sign would have specially constructed electric letters, sometimes as much as 20 feet tall. Any and all sorts of materials were available. Therefore, Artkraft Strauss was able to make such displays, as the one for "Captain Courageous," featuring a 45-foot boat which rocked on storm-tossed seas; or the display for "The Good Earth," which had a 50-foot neon dragon blowing smoke from its nostrils. The "How Green Was My Valley" sign, 75 feet by 100 in size, was made entirely of plate glass on which was painted a mural depicting a Welsh mining town, and illuminated from within.

MARQUEE SPECIALS

"The show must go on" and it will go on whether the signs are ready or not. A show opening without signs is like going to a formal affair without trousers. The time interval between shows is seldom if ever more than a mere 24 hours, which means that a complete reconstruction job must take place between the time when the last picture went out and the new one comes in. It takes close timing and intricate planning. In order to expedite matters, the engineering department designed the mosaic-sign. The pictorial matter which has to go on the bulletin was painted on small, easy-to-handle panels. The sign erectors, when the time for the change comes, would then fasten these panels to the bulletin. In place of rigging for painters, blocking out the old sign, repainting the new panel, all of which should take at least three to four days, the whole job was done in a matter of hours.

MARQUEE SPECIALS are frequently used for a greater eye-catching display than is possible with the usual changeable-letter signs. In such displays, the motif set by the picture's producer is carried into the display, with such other embellishments as the sign-maker's art can bring to bear. All pictures used in this article are of the work of the Artkraft Strauss Sign Corporation and have been reproduced through that company's generous cooperation.



THE DIM-OUT of the war years brought many problems to the sign makers, besides those headaches attributable to the scarcity of usual fabricating materials. Making displays of non-critical materials did not present an insurmountable problem, but how to maintain the gleam and glisten without electricity and light almost was —until the technique was perfected of using inch-square mirrors to reflect any light that might be available.

A majority of Broadway marquees are unique in that they have an additional feature incorporated into them. When the Artkraft Strauss builds a marquee for a Broadway house, it makes provision for the possible use of a single panel, in lieu of the usual attraction frames in silhouette or glass letters. Most of the houses are taking advantage of this innovation.

A picture usually has a certain definite motif and style of lettering which has been designed specifically for it. For example, the title may be written in long hand or script. This style can then be carried over on to the marquee by means of the panel. Flashing letters, neon letters, pictorial matter, animation, can be used on the marquees of the movie houses, that do not have other display media, or can be used in addition to their other display. Because the panels are designed and wired in accordance with the provisions allowed, a complete change of marquee panels or marquee signs can be consummated in a few hours.

DIM-OUT SPECTACULARS

During the construction of the "This Above All" sign, the dim-out regulations went into effect. Over night, this spectacular, composed of 15-foot letters, was re-converted into a none-glare, indirect lit sign. Immediately afterwards, restrictions were placed upon the use of metal and other vital materials. This indeed seemed like a catastrophe not only to theatres and Broadway advertisers, but to the Broadway populace as well. To Jake Starr, it was merely a challenge. Advertising and display need not stop because they could not blaze. There must be a way to feature these displays, bring them to the public's attention and yet not light up our coastline heavens as a guide to enemy submarines.

It's Done with Mirrors!

The engineering department of Artkraft Strauss then had the problem of finding non-priority materials of which to manufacture signs, and then to manufacture them so as not to violate regulations.

Which brings us to the most unusual of all Jake Starr's ingenious, original ideas. Unable to use direct light or lamps, unable to use metal (or even to get it!), and unable to obtain new wiring and all other materials pre-empted by war needs or forbidden by wartime precaution, a light flashed in his fertile brain—Mirrors.

"The Pride of the Yankees" sign was the first of a unique type of spectacular—unique because it contained not one inch of wire, not one metal screw, not so much as one pound of steel, and not one bulb. Blue and gold mirrors mounted on a canvass backing, cut to conform to the shape of huge letters, 10, 12 or 20 feet high, with a stroke, sometimes of two feet in width, will catch and reflect whatever light there is in the atmosphere—much as a diamond-cut stone does even in a limited light. Thus Broadway, in wartime dress, was effectively, magically advertised—and, as always in magic, it was all done with mirrors.

Each mirror is an inch square—in various hues of gold, blue, green, red, yellow, any and all colors designed—each square costing about one cent. Its effectiveness and cost can best be illustrated by imagining a bulletin measuring 40 x 75 feet, completely covered with these mirror squares, which would be equivalent to covering the face of a building with pennies.

Hand-Painted Displays

The idea of the use of mirror signs caught on like wildfire, and so despite wartime restrictions and regulations, Broadway was not cheated of its glamor.

During the dim-out, when circulation on Broadway moved up to an earlier hour, painted signs grew in importance and, literally, in stature, with greater emphasis on better art work, and with lighting merely as a supplemental aid. Non-electric displays therefore consisted of huge oil-painted signs or bulletins, or wood letters, covered with mirrors. It is fascinating to think of an artist oil-painting an enormous sign, let us say, like painting a 40-foot face of Gregory Peck. The artist at his easel, with his thin, pointed brush, is a far cry to the artist on a scaffold, swishing a two-or-three-inch brush on his oil painting. Yet both are artists, and both are oil paintings.

The "Mexican Hayride" Varga girl was, perhaps, the most alluring exponent of this type of mammoth oil-painting art. She was a gorgeous thing, as most readers no doubt remember, and she won tremendous publicity for Mike Todd, for "Mexican Hayride," and for herself.

Animated Displays

Ingeniously contrived animated displays, moving parts, dancing figures, were not lost to Broadway with the advent of the War Production Board regulations. Motors and bearings which were in stock (probably the only parts of displays which were salvageable) were used to animate figures. "See Here Pvt. Hargrove" had a small 10-foot Private Hargrove who trembled under the admonishing 50-foot sergeant, who wagged a finger and moved his jaws.

HAND-PAINTED DISPLAYS added their glamour to New York's famed Gay White Way, to bring the spectacular to bear on exploitation when the attraction of light was curtailed. This "Mexican Hayride" Varga girl was, perhaps, the most alluring of this type of mammoth oil-painting art. She was a gorgeous creature and won tremendous publicity for Producer Michael Todd, the picture, herself, and —to those noting the signatures in the lower left and right corners—Artkraft Strauss. Thus did non-electric signs of gigantic proportions keep alive the spirit of Old Broadway developed over the years through eye-catching, breath-taking displays.

PEACETIME SPECTACULARS

Two spectaculars have recently been completed. One is for Ruppert's Beer. This sign is to be located on the north corner of Duffy Square—a spot which is featured in all stock shots of Broadway that one sees in pictures. A 40-foot beer glass will be the center of attraction. Approximately 5,000 lamps and 2,000 feet of neon tubing will flash and twinkle to make this one of the most outstanding displays on Broadway in all the many years of spectacular signs and displays.

The other spectacular is constructed on a roof overlooking Times Square, and visible from any angle. The name of the product is written in script letters 20 feet tall. A neon, animated figure will model the apparel which is being advertised. Across the bottom of the sign face will be a traveling message sign advertising the stores where the product may be purchased.

Traveling Messages

The moving sign has been installed in various cities throughout the country for newspapers and radio stations. The sign operates with a Trans-lux sign control, and is so developed that as rapidly as the operator can typewrite is how rapidly the message can be changed on the sign. This type of sign can be called a "service" sign. This is the electric sign which first renders a service to its audience, and incidentally—in an aside, so to speak—modestly mentions the source of this service. These are the news signs, such as has made the Times Building a landmark and a cynosure for all eyes.

Clock signs which give the time and the product of the advertiser who gives the time; barometers, thermometers, weather signs, and the like. All these unfailingly get the public's attention, and also its good-will by the services they render—and in this way establish a feeling of warmth and perhaps unconsciously, gratitude, towards the advertiser and his product.

The Wondersign

No story on Broadway signs, or any signs, would be complete without the inclusion of the most wonderful sign of them all. It stands alone in the annals of all sign history as the most outstanding, unequalled in its intricacies of workmanship. That sign is the Wondersign.

With the lifting of the dimout, the RKO Palace Theatre, famous Broadway house, asserted its dominance with this gigantic electrical super-sign, covering the entire eight-story front.

Dominating and part of the new front is this marvel of electrical engineering, which presents a constantly changing series of animated electrical displays. It can make over a complete new sign every 20 seconds, the only sign in the country so equipped. Red, white, green, and yellow light bulbs, totaling 27,000 individual lights, and one mile of luminous neon tubing, form the dazzling spectacle which is nightly viewed by thousands of persons.

Under the Wondersign is a big attraction display with four rows of three-foot letters. An additional feature is a newsograph, consisting of letters 3½ feet high, copy on which can be changed instantaneously in contrast to other light-strip tickers which require more than an hour to change copy. This is equipped

to carry advertising copy about the picture, time, and weather or news flashes as an additional attention-getter. The whole display is topped with huge neon letters spelling out RKO Palace.

The new display was first used for the engagement of RKO Radio's "Those Endearing Young Charms," and has been used to tie-in with important events such as the visit to New York of General Dwight D. Eisenhower and the V-J Day celebration.

The sign used to be run on a cooperative basis, but now it is rented to one account, RKO Radio Pictures, Inc. The whole beauty of this sign is its flexibility and the ease with which we can change the copy.

Each picture on the sign has some sort of scene or something in keeping with the movie; for example, for "Along Came Jones," the copy read, "Gary shoots it out with a killer," and there was a picture of Gary doing just that! On "Back to Bataan," there was a sequence showing an aeroplane flying and being shot down in flames. From the ensuing explosion the words "Back to Bataan" was borne on smoke. Other times, certain pieces of copy are run for one day, such as "Welcome General Ike" or "New York Welcomes General Wainwright." Specials are run for different holidays, such as fireworks for the Fourth of July. The surrender of Japan was announced a few minutes after the news was received. The cost of manufacturing any other type of display would have been several hundred times the total cost of any one of these complete changes.

INSTITUTIONAL ADVERTISING

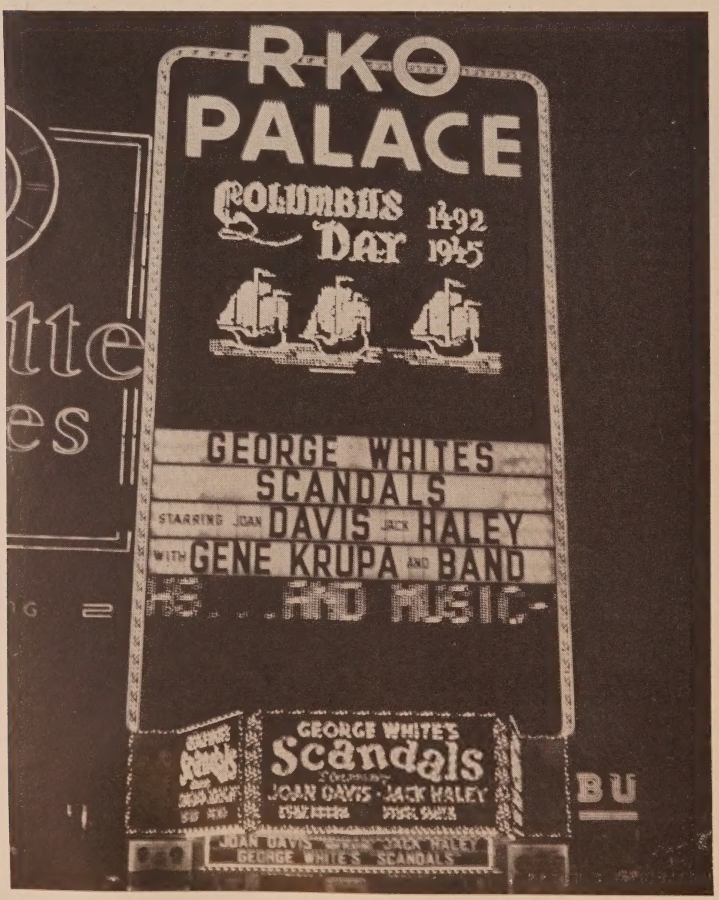
A most unusual form of advertising, also well within the province of "The Lamplighter," is institutional advertising—or the indirect advertising by all Broadway theatre houses in a form entirely different and apart from house displays, signs, or bulletins. This was best manifested during the war.

The erection of the huge cash register by Artkraft Strauss in the heart of Broadway served to aid the war effort as well as advertise all Broadway houses. This type of advertising is a happy conglomeration of all the facets of good advertising, plus service to the public and to the country in what can be aptly called a "Broadway Block Party."

Artkraft Strauss also erected the Statue of Liberty for the Motion Picture War Activities Committee. The statue was erected ten days after receipt of the order. The 60-foot lady was sculptured from a specially prepared concrete-and-plaster compound to withstand the ravages of the weather. Two stages were constructed on the 20-foot pedestal on which she stands, a traveling message sign was located at the feet of the statue, and a bond booth on the ground floor. Each theatre along Broadway took turns in supplying personnel and entertainment for the daily bond rally. The traveling message sign would announce each act as it appeared. The names of buyers of thousand dollar bonds or larger, would be flashed on the sign, as an added incentive to bond purchasers.

Instead of being a temporary display, the statue had become a permanent fixture on wartime Broadway. It became the center of all the rallies, all the drives in which the motion picture committees participated. For the March of Dimes, the Artkraft Strauss built a 30-foot birthday cake for the late President Roosevelt. For the Red Cross drive, a 25-foot Red Cross in glass. For the Seventh War Loan, a replica of the Statue of Iwo Jima was built, showing the famous six marines raising the flag. This statue has been moved to the Saint Albans Hospital, and is to become a pernent fixture.

THE WONDERSIGN—virtually three signs in one—is perhaps the most complicated ever constructed. It is composed (at the top) of a "moving-picture" are made up of thousands of light bulbs. Below this is the silhouette-letter sign, and at the bottom is traveling message. The "picture" portion can be manipulated easily and quickly, to meet the topical demands of the day, as well as to reflect salient points of the current feature.



FUTURE PROSPECTS

Now, with the war ended, Broadway's future looms as bright as her sensational speculators. All the experiences of the past, plus the ingenuity which produced newer, more original ideas during the emergency of wartime, will be combined towards the creation of a hitherto undreamed of future in the history of sign making. Experimentation has educated the engineering department so that now the pictorial matter, when used for three dimensional work, is purposely distorted in such a manner so that when it is suspended 20 or 30 feet above the ground, it would appear to the observer to have the necessary perspective. With newly invented materials from which to choose; with the combination of fine art work, stage lighting and designing, perfected electricks, and the potential use of three dimensional ideas and materials, there will emerge a radically new phase of sign displays.

The function of a spectacular, as in any advertisement, is to attract attention, secure interest, create a desire, and then finally to get action. But whether a moving-picture or a beer company uses the spectacular electric sign, one of the important facets of its presentation is position, or location. The old saw about the world beating a path to the door of the man who builds a better mousetrap does not hold much water in this day and age—not on Broadway, anyway.

Public apathy springs from the knowledge that if a man builds a better mousetrap, he will bring it to their attention; he will advertise it and they will know

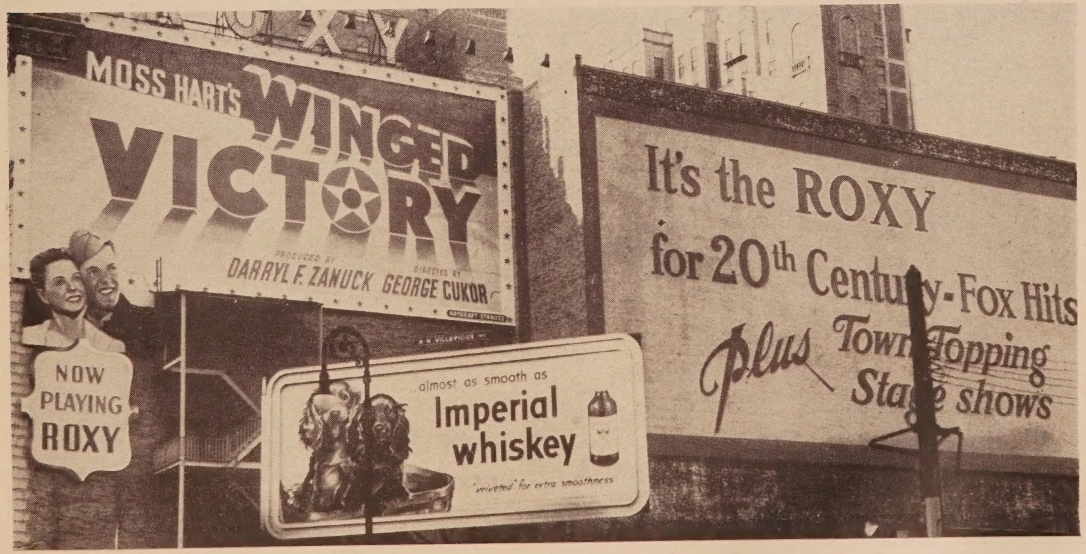
DURING THE WAR institutional advertising played a part in the motion-picture industry's efforts in the various drives. The statue of Liberty Enlightening the World is by this time the industry's most famous display, but other examples of institutional and current-feature advertising are shown in the picture. The most famous traveling-message sign in the world—that around the New York Times Building on Times Square, New York—is also seen. In the same way that these over-size displays created interest—and results—in the various drives—and good will for the industry—they will continue to serve all in the years of peace.

about it, so they do not need to bother beating a path anywhere. They will just saunter along and will see only what is strategically put before them, and will keep looking at what is so colorful, so brilliant, so amusing, or so interesting as to hold their interest, after their attention has been attracted. Thus they see only the electric sign which insinuates itself into their line of vision, and will not immediately look away only if what they see can hold their attention through the medium of light, action, color, or downright interest.

However, just as there are a limited number of first row center seats, there are a limited number of prime Grade A locations. Despite the fact that a location may not be most desirable; to overcome this, factors such as light, action, color, and motion are then produced.

The history of Manhattan's sparkling Broadway has been a fascinating one, but it is in its infancy. With the world at peace, with men turning to peaceful pursuits, with their efforts and ideas focused on things better, brighter and more beautiful, the epoch of sign display has yet to try its wings in the World of Tomorrow.

INSTITUTIONAL ADVERTISING is a big field for the maker of out-size displays. That the Roxy Theatre sign really is out-size is apparent by comparison with the standard 24-sheet and the 24-sheet-size liquor display. In the major cities—and particularly in New York—such institutional advertising by theatres is common, a part of the long-time, over-all exploitation no less than is the spectacular displays created for current attractions on screen and stage. In the post-war years, these institutional signs will, no doubt, become bigger and better as the materials for their construction and for their illumination become available to sign makers.



Outdoor Advertising as Exploitation Aid

Advantages of 24-Sheet Posting Outlined As a Medium of Advertising New Pictures

By C. D. McCormick
Vice-President, Outdoor Advertising, Inc.

Catching the public's fancy is an important factor in theatrical advertising, for success in the show business often depends upon how receptive the public is to your offering. It is something like developing a demand for impulse purchase that consumers buy.

In both cases outdoor advertising is well suited to help.

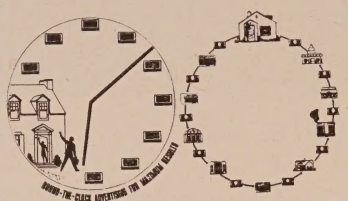
For shows, theatres, and movies, outdoor advertising has many commendations:

(1) It is big and colorful.
(2) Its pictorial presentations attract attention.
(3) It conveys the glamour and humor of the show to the public.
(4) Its dramatized appeal drives home the central idea or highlight of the show.
(5) It gets across the name of the show, the stars, the theatre, the date.
(6) It is always wide open to view—to everyone.
(7) It reaches all groups of people.
(8) It keeps repeating its message—morning, noon, and night.

Let us look into some of the outstanding features of this outdoor medium.

ATTENTION

Attention, one of the first requirements of any advertising, is a strong feature in outdoor advertising. Dramatized appeals so typical of poster advertising attract



people's attention and arouse their sympathy or desire for entertainment.

The 24-sheet poster is standardized throughout the United States and Canada. Its over-all size is 12 feet high by 25 feet long. It has standard white blanking around the advertisement and has lattice work beneath the panel. The advertisement proper consists of lithographed sheets of paper which are posted upon the surface of the panel with paste and brush.

IMPRESSIVE

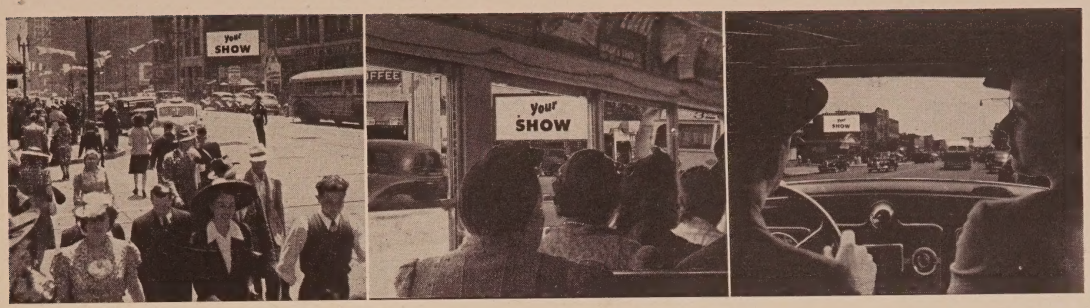
Theatrical posters always convey a forceful impression: pictures which portray the highlights of the show with maximum effect, pictures of stars who are known in every city and hamlet, who add glamor and interest to any offering, and short telegraphic messages that are grasped by everyone at a glance.

These basic elements make a powerful appeal to the public for they reflect the character of the show quickly, strikingly, and in a way everyone understands.

NAME ADVERTISING

Outdoor advertising has long been famous for its ability to present packages

THE STANDARD 24-SHEET POSTER is standardized throughout the United States and Canada. It is 12 feet high by 25 feet long. It has a standard white blanking around the advertisement, and has lattice work beneath the panel. The advertisement proper consists of lithographed sheets of paper which are posted upon the surface of the panel with paste and brush. Such posters, set along important traffic thoroughfares and in neighborhood communities, reach everyone—men, women, and children—of every group. Because they are big, they are "front page," compelling the viewers' attention to their compellingly constant suggestion.



PEOPLE ARE OUTDOOR CIRCULATION, whether they walk, ride, or drive, and the constant repetition of 24-sheet posting keeps telling its message to the people. Such poster advertising provides a market coverage at what is considered the lowest cost for every thousand of circulation (number of onlookers) of any major advertising medium. Through the constant repetition of the message and the inevitability of such posting being seen, their effect is cumulative and strong. All pictures and diagrams in this article have been especially prepared by Outdoor Advertising, Inc., the national sales representative of the industry.

and trade names, and it is just as well suited to feature the name of the show, the names of the cast, the name of the theatre, date line, where, and when. It keeps all these names in the public eye and on the tips of people's tongues.

Where night circulation is heavy, posters are illuminated.

COMPLETE COVERAGE

Just as theatres and shows draw their audiences from all sections of a city or town, so outdoor advertising reaches out into all parts of a city to present your show message to the people.

Posters are located along the major routes of travel, in both neighborhood buying communities, and at downtown points of heavy circulation.

Where there are people in large numbers, there are usually theatres—and where there are people and theatres, there are usually posters. Both theatres and posters follow the crowd.

Poster advertising is used in groups called "showings." These showings consist of a sufficient number of panels to provide coverage in all parts of the market.

PEOPLE'S DAILY ROUND

People like to be entertained. They are always receptive to things that will please them. Hence, they are usually responsive to the appeals of outdoor advertising which is on the job every day, morning, noon, and night.

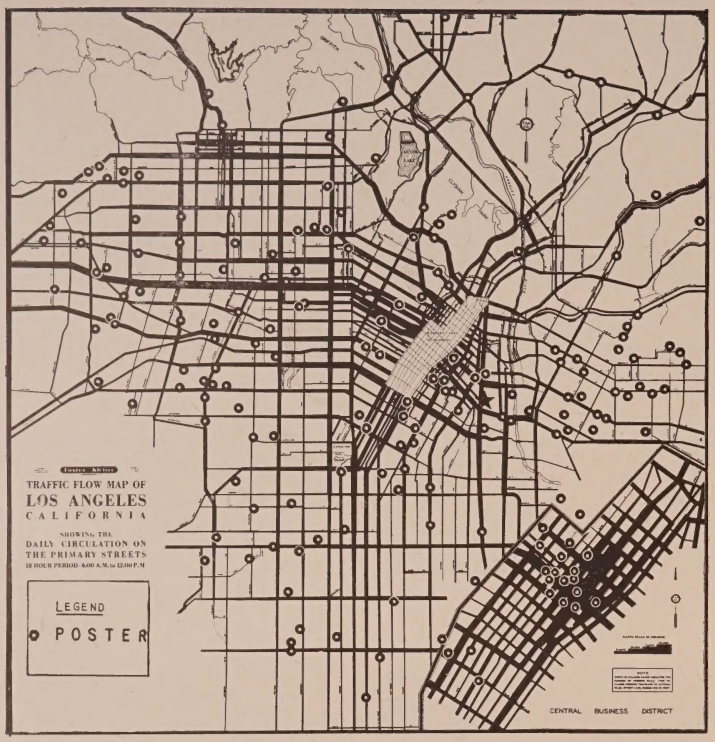
It reaches people in the course of their daily round—on the way to and from the grocery store, drug store, the station, post office, school, downtown stores, to the movies, beaches, resorts—at practically every turn big outdoor posters keep presenting their messages and appeals to people and influencing people to see the particular show being featured.

Outdoor advertising reaches people when other media cannot—namely, when people are outdoors. Thus it fits in with the other media to provide 'round-the-clock advertising.

CIRCULATION

With outdoor advertising, circulation includes every healthy person who gets out and about town, and they are all

VARIETY AND EYE-APPEAL of 24-sheet posters is unequalled in advertising, for their pictorial copy and telegraphic word message quickly tells the story to even the most casual of observers. Poster advertising is used by individual markets. It can be tailor-made to serve the advertiser's needs — in a single market or in a group of markets. As a single theatre may use this method, so, too, may an entire industry, since the idea back of the advertisement can be dramatized in its presentation to attain the maximum effect and to create the impression desired. Such advertising cost is low in relation to number of thousands reached.



PLACEMENT OF POSTERS is dependent, to a great extent, on the number of people who may be counted on to see a definite spot. Here in this traffic-flow map of Los Angeles is shown the daily circulation on the primary streets between 6 A. M. and 12 P. M. The circles indicate the positions of 24-sheet boards. Since the width of the lines indicate the relative volume of traffic, note well how the bulletins make the most of their situations.

potential prospects for shows of some kind.

In the case of shows the maximum in circulation is sought, and outdoor provides that maximum.

Outdoor advertising also reaches everyone in the show business—theatre managers, actors and actresses, box-office personnel, ticket agents, ushers, critics—in short, everyone.

COST

The cost of poster advertising varies in different markets. Here are typical costs for coverage in markets of various sizes which may be regarded as representative of their respective population groups.

The No. 100 coverage is generally regarded as the standard, but other coverages are available—the No. 50 coverage, which consists of approximately half as many posters and costs half as much, and the No. 25 coverage, which consists of approximately one-quarter as many posters at a quarter the cost.

LOCATION OF OUTDOOR ADVERTISING

To cover the subject of the location of outdoor displays, I quote from the Statement of Policy by the Outdoor Advertising Association of America, Inc.

Members of this Association will erect and maintain advertising structures only:
(a) upon property leased or owned by the members;
(b) in accordance with Association standards of construction and maintenance;
(c) consistent with established principles of safety, as defined by traffic and engineering authorities;
(d) in such a manner as to recognize and respect the public interest in (1) natural scenic beauty; (2) parks, parkways, and their immediate approaches; (3) historical monuments, shrines, and places;
(e) so as to respect the rights and interests of owners and occupants of property in fact residential.

Cost of a No. 100 Poster Advertising Coverage in Cities and Towns of Various Sizes

City or Town	Population	Number of Posters: Non-Illuminated	Number of Posters: Illuminated	Space Cost per Month
Chicago	3,396,800	100	60	$4,040.00
Minneapolis	507,100	30	20	1,200.00
Atlanta District	385,700	32	14	997.80
Fort Wayne Market	122,100	14	6	403.80
Waterbury, Ct. Dist.	137,300	10	6	450.00
Fresno Dist.	60,700	6	6	350.00
Fargo Mkt.	42,900	14	—	175.00
Burlington, N. J.	10,905	5	—	75.00
Atlantic, Ia.	5,802	3	—	28.80
Farmington, Iowa	968	1	—	10.80

PAINTED BULLETINS

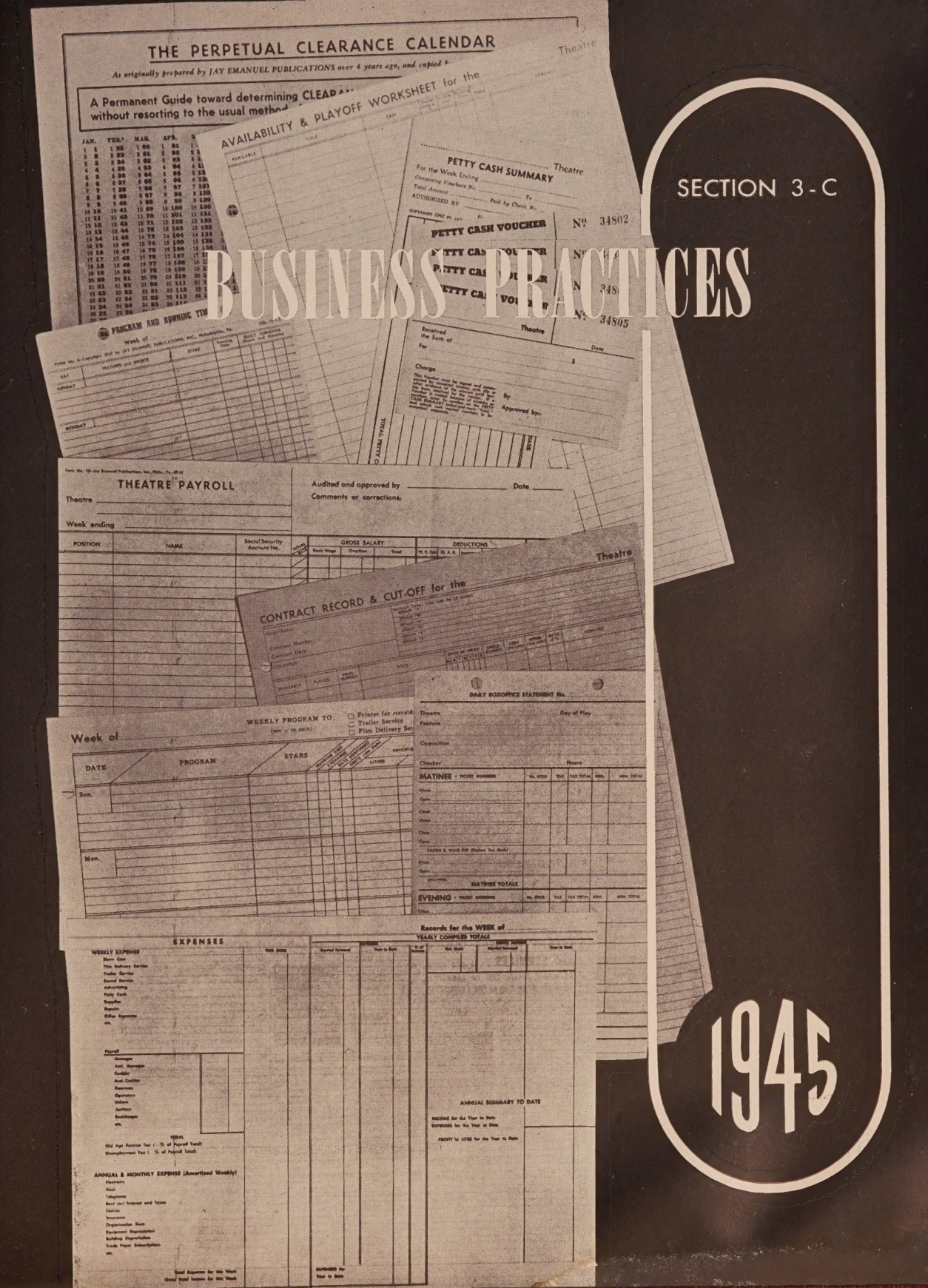
There are several forms of outdoor advertising, but by far the most popular is poster advertising, which is used on the basis of providing market coverage.

Another form of outdoor advertising in fairly wide use for theatres is painted bulletins.

With these bulletins the advertisement is painted by hand directly on the sheet-steel surface of the bulletin. Unlike poster advertising, which is used in groups to provide complete market coverage, painted bulletins are used on an individual basis—one, two, three, or more, according to the advertiser's wishes. The advertiser also selects the specific bulletin or bulletins he desires and cost is on an individual basis which varies, depending on size of bulletin, location, size of city, circulation reached, and other factors.

Full information regarding outdoor advertising in local markets may be had by calling the local outdoor advertising-plant owner whose name appears as an imprint on the poster panel or painted bulletin.

THE PAINTED BULLETIN, painted by hand on the sheet-steel surface of the bulletin, is particularly effective for the attraction that can be announced quite a bit in advance of opening and that can be depended on to spend some time at the theatre. These painted bulletins are used on an individual basis, the number depending on the advertiser's particular desire. Costs are based on size of bulletin, location, size of city, and circulation reached.



SECTION 3 - C

BUSINESS PRACTICES

1945

An Insurance Program for Theatre Owners

A Consideration of the Types of Coverage For Full Protection of Physical Property

By HENRY ANDERSON
Manager of the Insurance Department, Paramount Pictures, Inc.

Insurance is a highly technical subject, but we will attempt to outline in a non-technical, understandable manner the facts that any theatre operator should know about insurance.

An individual takes out insurance to protect him against a financial loss that he cannot, himself, afford to absorb. With few exceptions, there is no purpose in carrying insurance for any other reason.

The insurance program for any enterprise should be designed for that particular enterprise. To the operator of a single theatre, an uninsured loss of moderate size may seriously distort his operating costs, wipe out his profits, or even result in financial disaster.

The operator of a large number of thetres, on the other hand, should assume, himself, every risk that he properly can. Money spent for insurance premiums as a gamble is poorly spent, for the odds are two to one in favor of the insurance company.

There is no formula which can be produced to tell the operator of a theatre just what insurance he should carry. Selection of insurance should be based upon sound business judgment. The insurance of risks should be considered only in conjunction with the many other risks which a property owner leaves without insurance. To give a simple example: it seems inconsistent for a theatre owner to carry plate glass insurance if his losses due to falling off of receipts because of a rainstorm, which he does not insure, might exceed the cost of replacing a plate of glass.

Various forms of theatre insurance will be described as far as possible in the order of their importance.

PUBLIC LIABILITY INSURANCE

To a theatre operator, the most outstandingly important form is public liability insurance. It covers losses as a result of injuries to patrons or the public, occurring in or about or as a result of operation of the theatre.

The cost of this insurance is low. Legal expenses alone arising out of a minor accident may far exceed the premium for a number of years.

Losses under public liability insurance may in case of catastrophe run to substantial amounts.

The cost of adequate insurance is only fractionally greater than the cost of inadequate insurance. The additional cost of sufficient insurance is not worth consideration in comparison to the risk. Limits of $25,000 for injuries to one person and $500,000 in any one accident should in our opinion be the minimum. Substantially larger limits are recommended.

The form of policy under which this insurance is written is broad, especially if what is known as the comprehensive form is selected. It is not necessary to burden the theatre operator with a technical discussion of the policy form.

Theatre operation with its exploitation, tie-ups, sale of candy and popcorn, and its numerous activities involves many unusual risks, and a broad form is extremely important. Competent advice should be obtained to be certain that the policy covers these activities.

AUTOMOBILE PUBLIC LIABILITY

The theatre may own an automobile; may hire cars for transportation of material or persons; or theatre employes may use their cars on the theatre's business. In any such instances, the theatre may be held liable in case of accident. Automobile public liability insurance covering both direct and what is known as contingent liability should be carried.

Minimum limits of $25,000 for injuries to one person and $100,000 in any one accident should be carried.

WORKMEN'S COMPENSATION INSURANCE

This form of insurance is generally required by law. It covers the responsibility of the employer to his employes under the Workmen's Compensation Law of the state in which he is operating.

As in the case of public liability insurance, there is no purpose in attempting to cover the technicalities of this insurance in this article. The insurance policy is standardized and there is little, if anything, that the average employer can or need do to improve his workmen's compensation policy.

There are, however, one or two precautions that might be mentioned here. Due to the fact that in case of vaudeville, bands, etc., there may be some uncertainty as to whether the performer is an employe of the theatre or an independent contractor, or an employe of the band or act, it is important that public liability and workmen's compensation insurance be placed with the same company. This prevents one company claiming that the individual is an employe and the other that the individual is an independent contractor, each denying any responsibility meanwhile.

What is known as occupational disease coverage should be carried. More and more the workmen's compensation laws are being liberalized and more and more the compensation boards and the courts are interpreting the law in favor of the employe. At one time the law covered almost exclusively bodily injuries as a result of actual violence. Today, such things as poisoning by handling money, pneumonia contracted in a drafty dressing room, skin troubles contracted from the use of cleaners, soaps, and disinfectants may be interpreted as coming under the law and the employer may be held liable. It is important that the employer be protected by insurance.

ELEVATOR PUBLIC LIABILITY

This form covers with respect to injuries to persons in connection with the operation of elevators.

One outstandingly important feature of this form of insurance is that trained engineers representing the insurance companies make periodic inspections of insured equipment. The inspection service alone is generally considered worth the cost of the insurance. To an operator of a place of assembly this service is extremely important.

This insurance is a "must" where there is an elevator.

MACHINERY PROPERTY DAMAGE

These forms of insurance cover damage to boilers or machinery, to the premises, and to other property as a result of explosion of boilers, bursting of flywheels, damage to compressors, condensers, tanks, and the like.

Here, again, vitally important inspection service is included.

BUSINESS INTERRUPTION INSURANCE

We have purposely listed business interruption insurance ahead of fire insurance in order of importance. A minor fire may result in loss of business in excess of actual physical damage. The operator of the theatre may have very little investment in the theatre, but, particularly under conditions that prevail today, a fire may put him out of business for a considerable period of time. The forms of insurance in the general class of business interruption insurance are use and occupancy, rents, profits, and so forth.

Debunking the terms, it is actually insurance that will leave the operator in as good a financial position as he was before the fire occurred and will pay the profits that he would otherwise have earned, pay his taxes, rent, salaries of important employes who must be retained, in fact, all charges which continue even though revenue has ceased to

come in. There is too little of this insurance purchased. We hear again and again of the small business man put out of business permanently by fire. This is not necessarily because he was unable to collect insurance to cover the physical damage done by the fire, but probably because he could not afford to continue his fixed charges and re-establish himself after the interruption of his business by fire. It is not within the scope of this article to cover the technicalities of this form of insurance.

FIRE INSURANCE

Fire insurance is now commonly written with what is known as extended coverage, added to the policy. This makes the policy cover in addition to insurance against fire, insurance against windstorm, explosion, riot and civil commotion, aeroplane, and several other minor types of loss.

The value of extended coverage has been proven in recent hurricanes and was outstandingly proven in the case of the Empire State Building disaster.

The fire insurance policy is a highly technical document. It is, however, not within the province of this article to turn the theatre operator into an expert on this subject.

The owner of property, today, should make certain that he has adequate fire insurance. With increasing costs of labor, and material, the amount that he carried a few years ago, if sufficient then, is undoubtedly inadequate today. His policy may contain what is known as a co-insurance clause which is, in brief, a requirement that he carry insurance to the amount of 80 or 90 per cent or some other prescribed percentage of the insurable value; otherwise he may be penalized in case of loss.

It is important that he understand clearly what is meant by "insurable value," for the insurable value is the amount of insurance the owner should carry and also the amount that he may reasonably expect to collect in case of loss.

Book value is not insurable value, and may have little, if any, relation to the amount of insurance that he can collect. Real estate value is not insurable value. He may properly collect either more or less than the book value or the real estate value. The original construction cost is not the insurable value, nor is the fair sales value, nor is the purchase price the insurable value. They may have no bearing whatever on the insurable value.

The only true measure of insurable value is today's replacement cost of the damaged or destroyed building or equipment with an identical brand new building or equipment, less a suitable allowance for depreciation and obsolescence.

The one best way of determining this is to obtain the services of a thoroughly competent appraisal company. An insurance appraisal of this type is expensive but may be worth its weight in gold the day after the fire. Reasonably reliable appraisals may at times be obtained from local contractors, architects, engineers or of course from employes familiar with building construction costs.

If original building-cost records are available and no extensive improvements have been made, the original costs can be brought up-to-date by applying factors comparing today's costs with those of the year during which the theatre was built. The tables issued by the Engineering News-Record are generally accepted by insurance companies. From the cost so established should be deducted a percentage for depreciation, based upon the age and physical condition of the building.

The cost of excavation and foundations should first be deducted before any of these calculations are made.

The result of these steps produces the insurable value.

FIDELITY BONDS

A fidelity bond, as its name implies, protects the employer against losses caused by acts of dishonesty or infidelity of his employes. There are several forms of bond but it is not within the scope of this article to discuss them in detail. There are two principal plans: one is to bond each and every employe and the other is to bond only certain selected employes. The first is the safer, for the employe who may be in the poorest position to involve the employer in a loss may be the very one who causes the loss.

It should be borne in mind in establishing the amount of insurance to be carried under a fidelity bond that while the employe may take comparatively small sums at one time, over a long period of years, this may accumulate to a substantial sum.

An important service is rendered by the Bonding Company in investigating applicants.

SAFE BURGLARY AND HOLDUP

This form of insurance covers loss of money, securities and other property as a result of safe burglary or holdup. In order for a loss to be covered under a safe burglary policy it is necessary that the safe shall have been entered by force and violence of which visible marks shall be evident. The mere opening of a safe by manipulating the combination is not sufficient basis for a claim. The holdup must be an actual holdup as we commonly understand it. Money must have been taken with the knowledge of the custodian of the money, by violence or putting the custodian in fear of violence.

There has recently come on the market an improved form of protection for money and securities. Under this, many of the technicalities including those described above are waived and the mere fact that the money has been lost may be sufficient basis for claim. The additional cost of what is known as a "Broad Form Monies and Securities Policy" is justified.

LOSS AND ACCIDENT PREVENTION

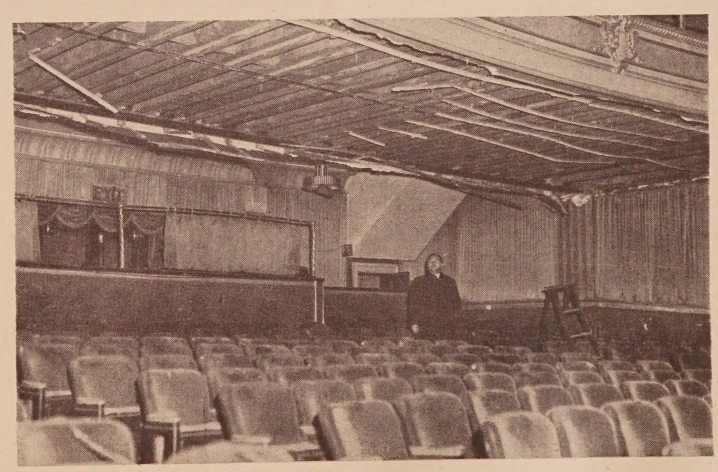
No discussion of insurance is complete without mentioning loss and accident prevention.

More and more various forms of insurance are paid for on what is known as an experience basis; that is, the cost is determined by the losses. It is thus to the advantage of the property owner or operator to do everything within reason to prevent losses.

What is more important to him is his legal liability in case of accident. He should so conduct his operations that following an accident he can clearly show that he had made every reasonable effort to prevent accidents.

This can be accomplished only by actual intelligent effort, and by constant vigilance. The manager must have the importance of safe operation uppermost in his mind, and impress it upon his employes constantly.

BUSINESS INTERRUPTION is, perhaps, the theatreman's most dreaded experience, regardless of what may be the cause of that interruption. For example, when a ceiling drops, as it did in this case, the theatre is forced to close for repairs, with a consequent stoppage of revenue. If the theatre is properly covered, a business-interruption insurance policy insures income to cover expenses that continue whether the theatre is open or not.



Forms and Systems in Efficient Management

How to Keep the Necessary Theatre Records To Insure Proper, Business-Like Operation

Just as there has been great progress in the film industry since the day when the small, gaudy nickelodeons borrowed chairs from the local undertaker and bought the Lubin or General Film contract for so many reels of film each week, so the responsibilities for arriving at practical business methods, adequate business records, and systems of cash control have kept pace with progress. The "old timer"—either because he had a relatively small investment in what even he may have doubted would become a permanent and solid business or because of his ofttimes background of "carnies," circuses, and road shows—did a highly speculative business "out of his hat". It does not take a very long memory to recall some who did their film booking on little memoranda and scraps of paper which bulged from their pockets; others who paid for film and equipment with coins and bills directly from their box-office cash drawers, sometimes not even bothering with the formality of a receipt; and still others who signed film contracts right and left without any intention of playing them off. This was the informal stage of embryonic development, when any system which existed was simply improvised by a particular man or group of men to serve a particular local need.

Surprisingly enough, some of the basic systems, forms, and methods of operation set up at that time still persist as the ideal or most workable yet developed by the industry. The exchange booking book, adopted from the vaudeville agents' system for keeping track of the availability of acts, was used at that time to record the availability of prints, and it remains today basically unchanged. "Cut-off" sheets to show in quick tabular form the terms, commitments, availabilities, and play-off of each theatre account are still maintained in a very similar style by all exchanges. Availability notices, billing methods, clearance structures, inspection records, and so forth, may have varied in type selection or arrangement, but the basic principles remain about the same.

This was particularly true of exchange operation for several reasons. First, even in the days of General Film and Vitagraph, it was a chain operation of relatively larger financial investment which necessitated bookkeepers and auditors who were naturally system-minded and contributed many of the ideas and forms which enabled them to check cold figures rather than to depend on someone's memory or memorandum slips. And, second, because of the very number of each company's branches and volume of customers in each branch, it was possible to amortize the cost of preparing and printing a particular form over a long print run.

In the theatre side of the industry, however, the development of forms, systems, and established methods was much slower. With predominantly independent unit operation, just as it is today, the owner or manager centered his complete attention to the operation of his one theatre and, therefore, did not, to the same extent, feel the need to reduce his memory to cold factual records. Whenever he did feel the need to produce such records, the cost of printing 5, 10, or at the most, 52 sheets a year made such records a luxury, so they were usually laboriously hand ruled and, therefor, abandoned by all except the very precise and meticulously careful. Only in the then budding theatre-circuit operation were the bookkeepers and auditors available, and the possibility to spread the preparation and printing cost over a long print run with a resultant low unit printing cost.

Then came the series of events and growing pains that made accurate theatre records not only desirable at any cost, but actually necessary and, in some cases, mandatory.

First, the original 5- and 10-cent nickelodeon was replaced by more substantial structures, with specially manufactured precision equipment and many patron-pleasing furnishings, all of which required a relatively large investment. A large investment usually required a bank loan or mortgage, and bankers and mortgagees wanted to see auditable proof of the borrowing capacity of the business.

Next, as added taxes were needed to support a succession of wars and depressions, the municipal, state, and federal fund-raisers, since industry revenues had increased, eyed theatre admissions as a solid source and passed tax laws. In some cases as many as four different taxes affected the box-office dollar. The tax boys were not taking any memory or memoranda figures, but demanded consecutively numbered tickets and auditable records to prove that they were getting all of the tax and not sharing it with some manager or owner.

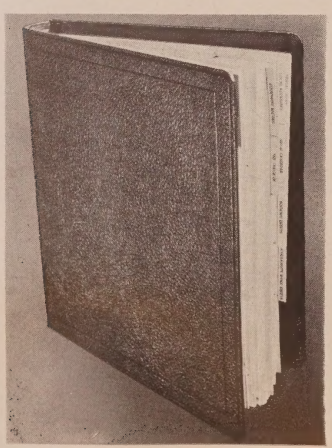
And last, but not least, the increase in the percentage buying of film gave the distributor a very real interest in authenticated gross-income figures, and ofttimes, when adjustments were sought, in expense and overhead figures as well.

At least one trade paper and an assortment of other individuals and theatre supply dealers recognized the need that existed and, by printing large quantities of many buying, booking, management, and bookkeeping record forms, were able to resell them to the theatreman at a low unit cost which made them economical for his use.

It is now pretty well established that theatre forms, systems, and methods can be divided into three groups: (1) Buying and booking records, (2) theatre management records, and (3) cash control and financial records.

And, for the benefit of this survey, we will only discuss those which have been tested and made available for many years to its subscribing theatres by the same tradepaper of 28-year standing, THE EXHIBITOR, the weekly sister publication to THEATRE CATALOG.

THE RING BINDER for the Service Kit forms discussed in this article is large enough to hold properly all the various items for an entire season. It is a standard three-ring binder, bound in sturdy Fabricoid.



A COMPACT FOLDED BRIEFCASE of sturdy Leatherette can also be obtained for the Service Kit forms. It contains two inner pockets for keeping papers. The standard three-ring binder is a built-in feature.

BUYING AND BOOKING RECORDS

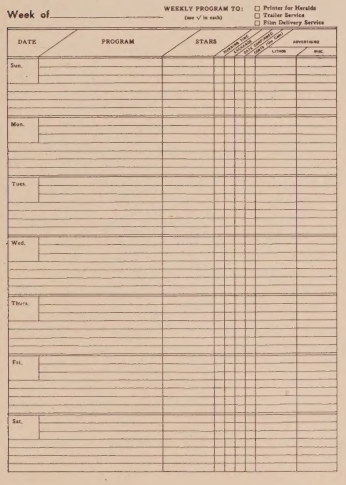
The Booking Book

When the theatre executive considers that the Booking Sheet for any one week is the stock record for his business, and the entire inventory of the sales merchandise he is offering to his public for that one week, it is easy to see that such records are of too great an importance to be relegated to scraps of paper or some pocket-size notebook not large enough to permit legible writing. Also, it is not sufficient to record the feature attraction alone. Record also must be made of the shorts, newsreels, and added attractions that complete the bill, together with the trailer service, film delivery, advertising materials, and other accessories that have been ordered to sell the whole program. As a result, a large sheet is necessary and preferably one which will fit into a standard ring binder or ring-equipped brief case, so that finished sheets can be extracted and either destroyed or filed, and new sheets added as needed instead of carrying around a full 52 or more weeks' supply.

The Booking Sheet, as supplied in THE EXHIBITOR's Service Kit of booking and buying forms is a full 12 inches high by 9 inches wide sheet and provides seven lines of space for each booking day. Listing the days of the week, starting with Sunday, these lines provide sufficient space for the legible listing of each feature, short, or stage show attraction, complete with the stars of each and the individual running times, names of distributor, receipt of date confirmation, and even costs or buying arrangements if a code is used. Adequate spaces are also provided each day for all lithos and miscellaneous advertising which has been ordered on each attraction. At the top of each sheet is listed the various duties which have to be taken care of later, such as the date when all the attractions for the particular week have been booked and confirmed; when special copy or a list of shows has been sent to the printer for heralds; to the trailer service for trailers or slides, and to the film-delivery service so that the prints can be picked up and delivered on the proper date.

Space and completenes are the keynotes of this system, and it reflects the type of records that any modern merchandiser would use in any successful business. Contrast this with the dog-eared little memoranda book sticking out of a pants or coat pocket as though its owner was taking horse bets or running a numbers bank or some other shady enterprise in which he was ashamed to carry normal business records.

THE BOOKING SHEET, a full 9x12 inches, provides for seven items in the show of every day in the week, with additional columns for indicating all pertinent facts and the things to be done for the show.



Availability and Play-Off Work Sheets

Varying clearances and assorted national and local release dates make the availability of features and shorts to any one theatre a necessarily shuffled and irregular supply. Weeks may go by without the receipt of any availability notices, only to be followed by another week in which a flood comes from each distributor with whom the theatre does business. And an availability notice is, at best, a flimsy, small memorandum which is both easily lost and easily mislaid among correspondence, records, or other availability notices. For this reason, what is known as Availability and Play-off Work Sheets have been designed, and a supply sufficient to the needs of any one theatre for a year are included in THE EXHIBITOR's Service Kit of booking and buying forms. These work sheets merely provide a means of compiling all of the pertinent data from individual availability notices on one sheet as they are received, so that subsequent loss of an individual notice is unimportant, and so that all available product can be scanned at the same time for ease in planning a program or actual booking.

The actual sheet breaks down into varying width columns, the following headings: (1) Availability date, (2) title of feature, (3) cost, (4) flat or percentage, (5) distributor, (6) running time, (7) actual playdate booked, and (8) remarks. In this last column, it is recommended that any data regarding the previous run, such as number of days played, the title of the other features with which it was doubled, or similar facts which might affect its ultimate gross in the following dates, should be kept.

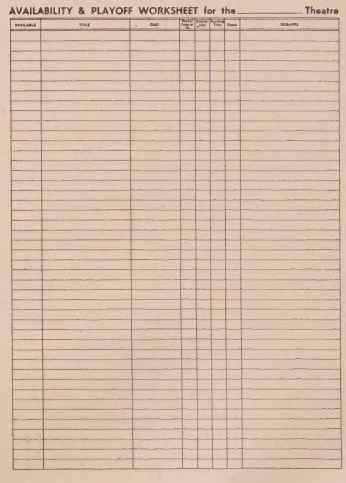
As the name implies, this sheet is not intended to be a permanent record, but only a coordinating work sheet from which the permanent records can be prepared. Each side provides space for 44 features, and the common practice is to draw a line through and forget the features which have been booked, so that the available, but unbooked features, stand out like proverbial sore thumbs. With such a work sheet, it is pretty difficult to overlook unplayed product, and after all features on a particular sheet have been booked, or the obligation to play removed by either paying but not playing, or special agreement with the distributor, the sheet can be tossed into the nearest wastebasket. The key to its effectiveness, however, is the prompt and consistent entry of all availability notices the day of their arrival so that the particular work sheet presents, at all times, a true picture of all available features.

The Contract Record and Cut-Off

In probably no other industry or other commodity is there so little relation between production and distribution cost and ultimate sales worth. It does not take much thinking to remember a a $2,000,000 epic that laid an egg and was not worth peanuts at the box-office; or a well-angled B picture which cost peanuts to make but did a percentage gross once it got away from the testy critics of the big-city first-runs. As a result, the average theatre owner must depend a lot on the smartness of a particular studio, the names they have available, or the record of success that its type of features has in his theatre, when he signs up for a season's releases or even for only a block of five. He also must not let himself be blinded by some one tremendous gross, or some one series or star's profitable features, and sign up for a lot of others on which he has consistently lost money. Therefore, the only true, unemotional and business-like way to buy product is to have before him an easily kept and easily understood record of the last features played from the particular company, the circumstances of days and dates on which they were played, and profit or loss, both picture by picture and as a group or season.

For this purpose THE EXHIBITOR's Service Kit provides a specially prepared contract record and cut-off sheet for an entire season's play of each company's product. Its use should start with the actual signing of a group or seasonal contract and, at that time, all conditions of (1) distributor name, (2) contract number, (3) contract date, (4) clearance or other considerations of week-end dates, percentages, splits, and so forth, and (5) just exactly what was bought and the prices or percentages agreed to

THE AVAILABILITY AND PLAYOFF WORKSHEET provides a fast and easy way of recording the when-can-play and have-played data on a theatre's pictures. Space is provided for 44 items on each side of sheet.



should be entered on one sheet. With this sheet started, the actual wordy and bulky contract can be filed away, for the pertinent, every-day facts are now easily scanned and should be added to as the results are actually experienced. Its use should not be restricted to features alone, but should include all contracts on shorts, newsreels, and other subjects.

For continuing use, the sheet treats in columnar form: (1) Date available, (2) date played, (3) production number, (4) title, (5) days of the week on which features played, (6) group number, (7) percentage or flat cost, (8) actual gross, and (9) remarks. Under the last column should be recorded any holiday date, weather condition, local event, premium give-away, or other feature with which it was doubled, that might have conceivably effected the recorded gross. Day by day and feature by feature, this sheet should be kept up to date and should record the individual success or failure of each individual feature. Separate blocks should be entered in blocks as purchased and ruled off and totaled when the play is completed. Seasonal buys should be recorded in brackets—i.e., if 5 features at 35 percent and 10 features at 25 percent constitute the top prices, the 5 blank lines should be left and ruled off, and then 10 blank lines should follow and be ruled off for the later designations. In either event, a quick pencil totaling of the net cost column and the gross income column can show definitely, at any time, the actual percentage cost to you of that distributors product right up to the last picture played.

The data on shorts need not be so extensive, for their return at the boxoffice can not be so definitely traced. It is necessary, however, to keep an accurate check on the number of each series to which you are committed, their unit cost, your cancellation privilege, the number available, and the number played. If paid for, on a weekly payment plan, the beginning and termination of payments is important. The latter applies to serials and newsreels as well.

This system merely applies to each distributor the same "cut-off" or spread of knowledge which his exchange keeps on every theatre customer in each territory. Each exchange supports a staff of clerks and bookkeepers so that a manager, salesman, or booker can glance at the card of any one theatre and tell the owner promptly when he played any feature or short, what dates he owes them, and any other facts which will support their business trading. By using this system in reverse fashion, the theatre owner is also up to date and can support his business statements or trading, with definite facts. It has proved to be an invaluable aid toward rationalizing and systemizing the buying of film.

Reviewing and Index Records

Both for aid in intelligent current booking, and for reference in later years to potential re-issue material, it has been found that some trustworthy reviewing service is needed by most theatre executives. Unless the particular executive is operating close to his particular film center and has ample time to attend all trade screenings, it is obviously impossible for him to see, in advance of booking, every feature which he must advertise and play. Fortunately, most trade papers and several outside bureaus review most of the more important features, so the average theatre man has many sources of such advice available to him. It might be recommended that he spot check one or more of these reviewing services against his personal opinion of 20 or 30 features which he plays, until he finds the style of reviewing, and honesty in reviewing, which he feels best suits his own judgment. Once established, however, he ought to depend on the opinions of that service only and not be swayed by the laudable quotes from more Pollyana reviewers which may be dropped into his lap by some home-office exploiteer.

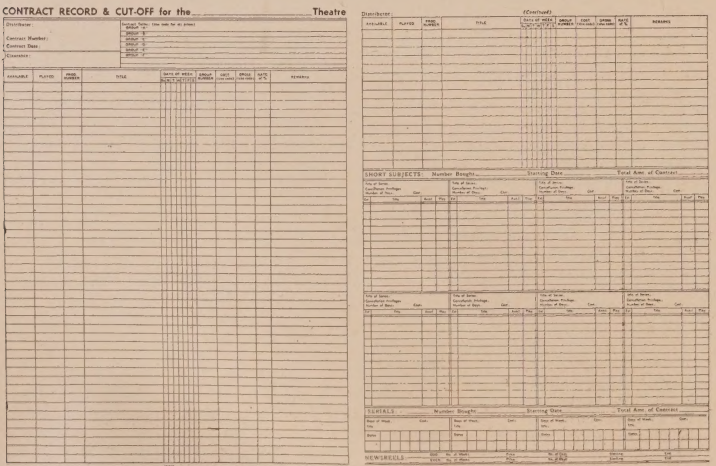
The next question is how to file and save all current reviews for reference when the picture is available, or later on when looking up a re-issue.

The method used by THE EXHIBITOR is to print its reviews and indexes as a separate, loose, punched-for-a-ring-binder, second section to each week's issue. When the weekly magazine arrives, the reader may read thoroughly or only glance at the second section, but it is a simple matter to slip it into a ring binder without, in any way, mutilating, scissoring or otherwise damaging the news and feature sections of the main book. As this second section is consecutively numbered from issue to issue, the new section, which is placed at the back of the ring binder, maintains the numbering for easy reference and has on its last page a complete index to all previous reviews of that particular season. When the given season ends, it is, therefore, a very simple matter to remove the reviews so compiled and file them away for occasional reference in succeeding years. Such permanent files justify their existence in innumerable ways.

The Finger-Tip File as sold through THE EXHIBITOR's Book Shop is one tested and much used method of permanently saving the reviews of past seasons. This file consists of a number of patented adhesive strips covered with waxed muslin in much the manner of the popular Band-Aid, and bound between stiff book covers. Again working from front to back, each individual review section is inserted by stripping off the waxed muslin and pressing the section down against the fresh adhesive. Once so inserted, the paper itself will tear before the anchor of adhesive will give way, so that there is little likelihood of losing pages or sections.

A good, standard ring binder can also be used for this purpose, but the very ease of adding or subtracting reviews increases the possibility of losing the very section containing valuable re-issue material needed several years later. If a book bindery is available, the ring binder could be used for any current year and then the accumulated reviews taken out and forwarded to the bindery for permanent stitching into a book case volume.

THE CONTRACT RECORD AND CUTOFF FORMS provide for the records of each company's product purchased for a specific theatre, with provision (shown at the left) for the recording of the availability date, title of the feature, cost, whether bought flat or at a percentage, the distributor, running time, actual playdate, and remarks. The feature-listing continues on the back of the sheet (shown at right), with space provided for similar data on shorts.


CONTRACT RECORD & CUT-OFF for the _____ Theatre

Distributor:

Contract Number:

Contract Date:

Expiration:

AVAILABLE | PLAYED | PROD. NUMBER | TITLE | DAYS OF WEEK | GROUP NUMBER | COST (or terms) | GROSS (less taxes) | RATE (%) | REMARKS

(Continued)

SHORT SUBJECTS: Number Bought _____ Starting Date _____ Total Amt. of Contract _____

SERIALS: Number Bought _____ Starting Date _____ Total Amt. of Contract _____

NEWSREELS: Number Bought _____ Starting Date _____ Total Amt. of Contract _____

Booking and Perpetual-Clearance Calendars

Both on his office wall and bound into his booking book, the executive theatreman should have available a legible calendar of at least 12 full months on one sheet, so that he can calculate ahead the 30 to 60 day clearance and booking period. The conventional calendar pad of a single sheet for each month is of little use for this purpose, for it must be turned over and back time after time in order to approximate any one given date.

As a service to its readers, and available free to any domestic theatre making a request to the publishing office, THE EXHIBITOR for many years has prepared such an annual calendar. This latter calendar actually turns the year, showing the month of December from the preceding year, and the month of January from the following year, or a total of 14 months on one large sheet. The purpose of this, at the start and finish of any given year, is obvious to the man who has ever used it. Set in bold, black

numerals which are easy to read, even at distances, all holidays, both legal and with possible box-office advantages, are clearly and legibly indicated.

A Perpetual Clearance Calendar is mainly needed in the booking book only, or possibly under the glass of a desk top. It is in this latter location that many exchange bookers throughout the U.S.A. use the Perpetual Clearance Calendar as originally prepared by THE EXHIBITOR many years ago, but since often reprinted by contemporaries.

Actually the Perpetual Clearance Calendar is changeless and not affected by the calendar year. Its purpose is to level out the odd number of days in each month so that to arrive at an availability date, the executive need not reason whether he is counting through a 31-day January or a 28-day February. As a matter of fact, he need not count at all, but only add his days of clearance to a number opposite the date on which it starts, and quickly arrive at the availability date. A robot or slide rule for quick dating, its method is more fully explained by an illustration elsewhere in this article.

THEATRE MANAGEMENT RECORDS

In the category of theatre management records, there are some which are absolutely necessary to efficient management and others which are merely helpful. Of the former, one of the most important is a permanent equipment record.

Permanent Equipment Record

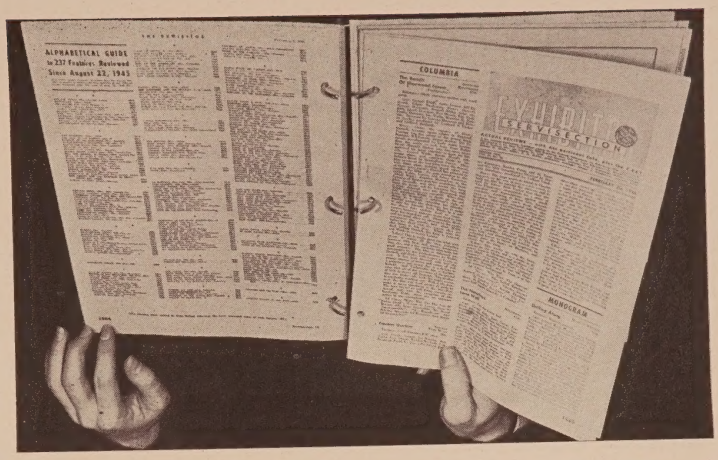
Most executive theatremen can remember numerous occasions when in the buying of equipment or supplies while in their local film center, they had to depend on their own memory or guess, or on that of their favorite supply dealer, as to the model, make, or dimensions of some one piece of equipment or some one location in their theatre. With all of the different types of projection, sound, comfort, air-conditioning, etc., equipment in the modern theatre, it would be a memory test indeed to remember all pertinent data about each individual piece, aside from all physical dimentions of the theatre as well.

To reduce all of these data to one permanent record, only changed when some new piece of equipment is purchased, or some remodeling should change the physical contours of the theatre, THE EXHIBITOR, in its Service Kit, provides such a form. Kept right with the Booking and Buying sheets, this seems to be the one best place to carry it with the certainty that it will be available as needed. The most beautiful inventory of equipment on file in your theatre is of no use to you whatsoever if that file is a hundred or more miles away from where you are discussing purchases or repairs.

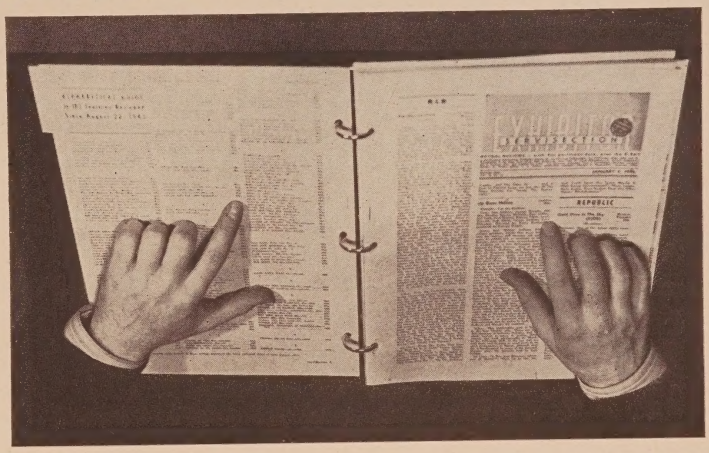
Itemizing in complete detail all facts, from the angle and length of the projection beam to the capacity of the curtain control motor, such a record, if carefully prepared once, can be of invaluable aid to many future times.

List of Local Addresses and Phones

Again to be inserted right with the Booking and Buying sheets as the one place that is always at hand, should be a

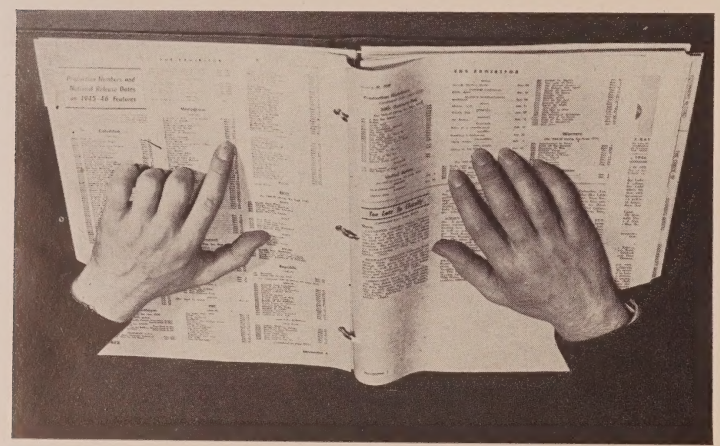


REVIEWING AND INDEX RECORDS. The system of reviewing and indexing pictures of the current season, as developed by THE EXHIBITOR, is not only the industry's most complete but also the most easily worked. The review section is published as an independent section, and come to the subscriber already punched for insertion in the Service Kit. Each new review section should be inserted (above) immediately following the last one.

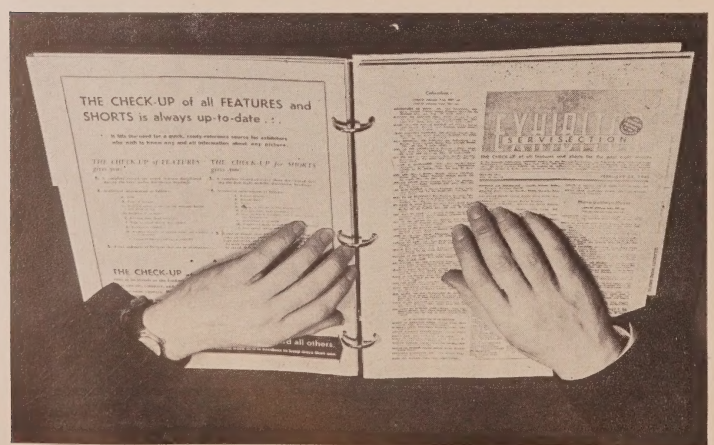


IN LOOKING UP A PICTURE, only the latest index should be consulted. When the title is found in this latest cumulative index (which also is maintained up-to-date in regard to changes in title and running time), as shown above, one turns to the page indicated (below) whereon the complete review will be found. Sufficient facts and suggestions are given with each review that any picture can be intelligently exploited even without a pressbook.

AT THE START of each new season, all reviews should be removed from the Service Kit, and permanently bound in the Finger-Tip File (below). The File then becomes the exhibitor's own permanent record of all pictures. Thus, the record becomes increasingly valuable, as he may pick up, from time to time, the better pictures of yesteryear which are not part of a company's regular releases and, of course, would not be in the current review section.



THE PRODUCTION NUMBER LISTING, with national release dates, is also regularly carried (above) in the review section, for quickly determining the potential availability of pictures. In the Check-Up (below) published alternately with the Review Section, is the statistical data on all reviewed and coming pictures. Since each edition is complete, only the last is important, for here is the authoritative check list of the past eight months' pictures.



specially prepared list of all film exchanges, their addresses, telephone numbers, and the particular booker, salesman, or manager with whom business is done. This list also should include your printer, film delivery, sign painter, supply dealer, organization, specialty house, cigar store, or any other place of business that you might want to call or visit during your business day. The booking book you always have with you, but the phone book is often not available, and even if one is, a lot of time is wasted in thumbing innumerable pages.

Program and Running-Time Schedules

Most theatres, other than the larger community first-runs, change their bill of entertainment at intervals of two, three, or even as many as seven times a week. The greater the number of changes, as the weeks roll on, the greater is the difficulty for even the executive to remember current and coming attractions, their stars, their running times, or the hour and minute of the show break through a particular day. For the cashier, doorman, head usher, or projectionist who has not booked the show or kept aware of it through the trade papers, this difficulty becomes a virtual impossibility; and yet they are the very persons who must answer the patrons inquiries or pull the short that will permit prompt closing and a minimum of overtime.

Many executives solve this difficulty by staff meeting once each week at which the house personnel make notes of the bookings, or by supplying the house personnel with improvised slips of paper to which they can refer when the inevitable questions are asked.

The padded forms available through the Book Shop, maintained by THE EXHIBITOR, are miniature versions of the Booking sheet. Arranged from Sunday to Saturday of each week, they provide an easy form for the listing of all features and shorts, stars in each, running time of each, and the hour and minute of the daily turnovers of each. Space also is provided for the listing of titles and dates of any important coming attractions that might be added to the employee's answer as an exploitation stunt. Space is also provided for any special instructions to all personnel that might apply to a house policy or a stunt of the particular day.

Other Forms for Convenience

Of lesser importance, and usually improvised as needed as an aid to efficient management, are Periodic Inventory Forms for checking supplies; Management Check Lists of cleanliness, efficiency, equipment conditions, and so forth; and Service Manuals for the training and routining of new employees, and the like.

CASH CONTROL AND FINANCIAL FORMS

As this is being written, there is persistent rumor of the bonding of a theatre by a responsible bonding company in order to insure the distributor of full return of the dollars to which he is entitled from percentage engagements, sub-

THE PERPETUAL CLEARANCE CALENDAR

JAN.	FEB.*	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.*	MAR.	APR.	MAY	JUNE
1 1	1 32	1 60	1 91	1 121	1 152	1 182	1 213	1 244	1 274	1 305	1 335	1 366	1 397	1 425	1 456	1 486	1 517
2 2	2 33	2 61	2 92	2 122	2 153	2 183	2 214	2 245	2 275	2 306	2 336	2 367	2 398	2 426	2 457	2 487	2 518
3 3	3 34	3 62	3 93	3 123	3 154	3 184	3 215	3 246	3 276	3 307	3 337	3 368	3 399	3 427	3 458	3 488	3 519
4 4	4 35	4 63	4 94	4 124	4 155	4 185	4 216	4 247	4 277	4 308	4 338	4 369	4 400	4 428	4 459	4 489	4 520
5 5	5 36	5 64	5 95	5 125	5 156	5 186	5 217	5 248	5 278	5 309	5 339	5 370	5 401	5 429	5 460	5 490	5 521
6 6	6 37	6 65	6 96	6 126	6 157	6 187	6 218	6 249	6 279	6 310	6 340	6 371	6 402	6 430	6 461	6 491	6 522
7 7	7 38	7 66	7 97	7 127	7 158	7 188	7 219	7 250	7 280	7 311	7 341	7 372	7 403	7 431	7 462	7 492	7 523
8 8	8 39	8 67	8 98	8 128	8 159	8 189	8 220	8 251	8 281	8 312	8 342	8 373	8 404	8 432	8 463	8 493	8 524
9 9	9 40	9 68	9 99	9 129	9 160	9 190	9 221	9 252	9 282	9 313	9 343	9 374	9 405	9 433	9 464	9 494	9 525
10 10	10 41	10 69	10 100	10 130	10 161	10 191	10 222	10 253	10 283	10 314	10 344	10 375	10 406	10 434	10 465	10 495	10 526
11 11	11 42	11 70	11 101	11 131	11 162	11 192	11 223	11 254	11 284	11 315	11 345	11 376	11 407	11 435	11 466	11 496	11 527
12 12	12 43	12 71	12 102	12 132	12 163	12 193	12 224	12 255	12 285	12 316	12 346	12 377	12 408	12 436	12 467	12 497	12 528
13 13	13 44	13 72	13 103	13 133	13 164	13 194	13 225	13 256	13 286	13 317	13 347	13 378	13 409	13 437	13 468	13 498	13 529
14 14	14 45	14 73	14 104	14 134	14 165	14 195	14 226	14 257	14 287	14 318	14 348	14 379	14 410	14 438	14 469	14 499	14 530
15 15	15 46	15 74	15 105	15 135	15 166	15 196	15 227	15 258	15 288	15 319	15 349	15 380	15 411	15 439	15 470	15 500	15 531
16 16	16 47	16 75	16 106	16 136	16 167	16 197	16 228	16 259	16 289	16 320	16 350	16 381	16 412	16 440	16 471	16 501	16 532
17 17	17 48	17 76	17 107	17 137	17 168	17 198	17 229	17 260	17 290	17 321	17 351	17 382	17 413	17 441	17 472	17 502	17 533
18 18	18 49	18 77	18 108	18 138	18 169	18 199	18 230	18 261	18 291	18 322	18 352	18 383	18 414	18 442	18 473	18 503	18 534
19 19	19 50	19 78	19 109	19 139	19 170	19 200	19 231	19 262	19 292	19 323	19 353	19 384	19 415	19 443	19 474	19 504	19 535
20 20	20 51	20 79	20 110	20 140	20 171	20 201	20 232	20 263	20 293	20 324	20 354	20 385	20 416	20 444	20 475	20 505	20 536
21 21	21 52	21 80	21 111	21 141	21 172	21 202	21 233	21 264	21 294	21 325	21 355	21 386	21 417	21 445	21 476	21 506	21 537
22 22	22 53	22 81	22 112	22 142	22 173	22 203	22 234	22 265	22 295	22 326	22 356	22 387	22 418	22 446	22 477	22 507	22 538
23 23	23 54	23 82	23 113	23 143	23 174	23 204	23 235	23 266	23 296	23 327	23 357	23 388	23 419	23 447	23 478	23 508	23 539
24 24	24 55	24 83	24 114	24 144	24 175	24 205	24 236	24 267	24 297	24 328	24 358	24 389	24 420	24 448	24 479	24 509	24 540
25 25	25 56	25 84	25 115	25 145	25 176	25 206	25 237	25 268	25 298	25 329	25 359	25 390	25 421	25 449	25 480	25 510	25 541
26 26	26 57	26 85	26 116	26 146	26 177	26 207	26 238	26 269	26 299	26 330	26 360	26 391	26 422	26 450	26 481	26 511	26 542
27 27	27 58	27 86	27 117	27 147	27 178	27 208	27 239	27 270	27 300	27 331	27 361	27 392	27 423	27 451	27 482	27 512	27 543
28 28	28 59	28 87	28 118	28 148	28 179	28 209	28 240	28 271	28 301	28 332	28 362	28 393	28 424	28 452	28 483	28 513	28 544
29 29		29 88	29 119	29 149	29 180	29 210	29 241	29 272	29 302	29 333	29 363	29 394		29 453	29 484	29 514	29 545
30 30		30 89	30 120	30 150	30 181	30 211	30 242	30 273	30 303	30 334	30 364	30 395		30 454	30 485	30 515	30 546
31 31		31 90		31 151		31 212	31 243		31 304		31 365	31 396		31 455		31 516	

THE PERPETUAL CLEARANCE CALENDAR is a permanent guide toward determining clearance of a picture following its prior run without resorting to the usual method of counting days on a calendar. Here is how it is used. To find the availability date of a picture, add the clearance period to the heavy black number following the date upon which the prior run completes exhibition. The date opposite the total thus obtained is the availability date for the subsequent run. Example: A first-run closes April 16. The clearance period is 105 days. The heavy black number after April 16 is 106. Now, add 105 (the number of days of the clearance period) to 106, and the total is 211. Looking down the black-figure column to 211, the date is found to be July 30. However, the clearance period is often counted, not from the last of the prior run, but from the day after that, which would merely add a day. In the example, this would be July 31. In Leap years, adjust by moving availability date forward one day when February 29 enters the equation. This calendar is one of the most valuable items of the Service Kit.

ject to later audit by a reputable independent certified public accountant, who will not disclose the whole books but only such discrepancies as the bonding company must make good and look to the theatre for reimbursement. This, it is claimed, will eliminate some of the current evils inherent in both open and dark checking. Whether this will ever eventuate is problematical, and if it should, both the bonding and accounting firms would probably require a common form of bookkeeping which satisfies their particular requirements.

In the meantime, however, the cash control and financial records of each theatre or each circuit of theatres is being interpreted according to the problems and available time of the theatre executive. Where circuits are sufficiently large to support a home office and one or more bookkeepers, some very fine systems are in effect. As the numerical majority of United States theatres are not in this category, a great variety of forms and methods are in use, and many of them are completely inadequate to either efficiency or to the knowledge requirements of the executive. In an effort to formalize such matters, THE EXHIBITOR, as long ago as 1934, retained the accounting firm of William A. Levick and Company, who were auditors for several hundred theatres, to prepare a simple but adequate theatre bookkeeping book. Since then, not only has the original book been twice revised, but other forms and systems have been added to it so that a maximum number of theatres could be best served.

Some of these forms and systems are as follows.

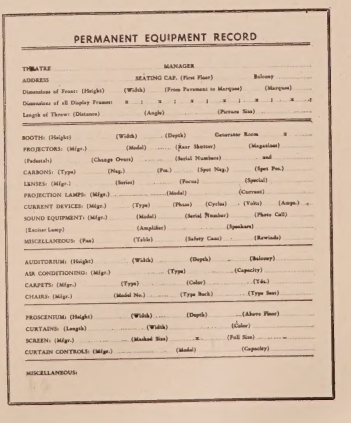
Daily Box-Office Statements

The major income to any theatre is through the sale of little pieces of paper which vary in price to adults and children, or at certain hours of the day. The place where the sale takes place is always the same, the box-office. As a result, it is much easier to keep an accurate record of sales and income than in any other retail establishment where hundreds or thousands of items, at a variety of prices, must be sold in a single business day. Another point of simplification is that there is no stock-keeping or inventory. Nor are there charge accounts and billing. Therefore, a simple daily form kept thoroughly, accurately and completely, is the only theatre need for a record from which all other permanent books and periodic profit and loss statements can be prepared.

The Daily Box-office Statement, as prepared for the Book Shop of THE EXHIBITOR and sold only for the service of subscribing theatres, is headed by a record of (1) the statement number, (2) the feature, (3) the day of the run, (4) the opposition, (5) the checkers name, if any, and the hours he officially checked. Below this are spaces for separate matinee and evening totals of (1) the closing and opening ticket numbers of each price ticket, (2) the number sold of each price, (3) the rate of tax and the total tax on each price, and (4) the net admission price and total admission income from each price range. Space also is allowed for similar records on pass and walk-in admissions, so that at the end of either the matinee or evening-price period, or at the end of the day, complete records of every single patron who walked through the entrance doors, the total tax owed Uncle Sam, and the total net income to the theatre can be easily totaled. As the closing ticket number will always be greater than the opening number, the former should always be placed on top for ease in subtracting to gain total sums.

Another convenient record found in this form is a place at both the matinee and evening totals to record the weather

THE PERMANENT EQUIPMENT RECORD is not an inventory, but rather a means for giving the theatreman the pertinent and critical data he needs in ordering proper materials or in making over-the-counter buys.



PERMANENT EQUIPMENT RECORD

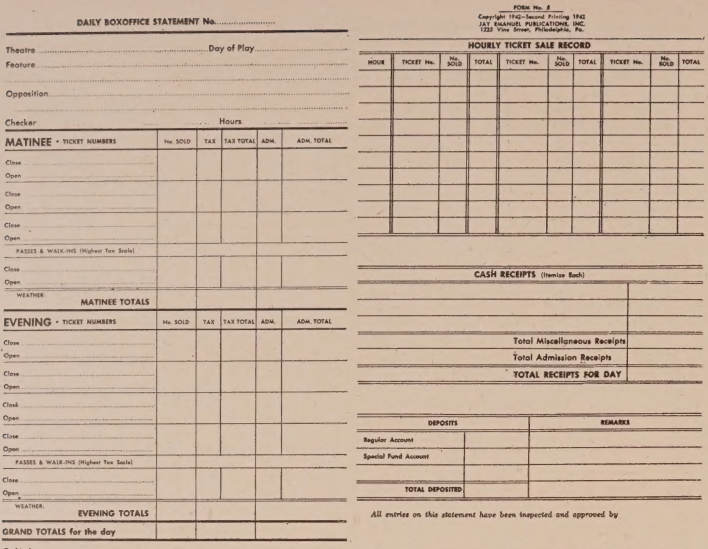
THEATRE ..... MANAGER .....
ADDRESS ..... SEATING CAP. (First Floor) ..... Balcony .....
Dimensions of Front: (Height) ..... (Width) ..... (From Pavement to Marquee) ..... (Marquee) .....
Dimensions of all Display Frames: H ... | ... W ... | ... H ... | ... W ... | ... H ... | ... W ... | ... H ... | ... W ... | ... H ... | ... W ...
Length of Throw: (Distance) ..... (Angle) ..... (Picture Size) .....

BOOTH: (Height) ..... (Width) ..... (Depth) ..... Generator Room ..... H ..... W .....
PROJECTORS: (Mfgr.) ..... (Model) ..... (Rear Shutter) ..... (Megastone) .....
(Pedestals) ..... (Change Over) ..... (Serial Numbers) ..... and .....
CARBONS: (Type) ..... (Mag.) ..... (Pos.) ..... (Spot Neg.) ..... (Spot Pos.) .....
LENSES: (Mfgr.) ..... (Series) ..... (Focus) ..... (Special) .....
PROJECTION LAMPS: (Mfgr.) ..... (Model) ..... (Current) .....
CURRENT DEVICES: (Mfgr.) ..... (Type) ..... (Phase) ..... (Cycles) ..... (Volts) ..... (Amps.) .....
SOUND EQUIPMENT: (Mfgr.) ..... (Model) ..... (Serial Number) ..... (Photo Cell) .....
(Exciter Lamp) ..... (Amplifier) ..... (Speakers) .....
MISCELLANEOUS: (Pos) ..... (Table) ..... (Safety Cans) ..... (Rewinds) .....

AUDITORIUM: (Height) ..... (Width) ..... (Depth) ..... (Balcony) .....
AIR CONDITIONING: (Mfgr.) ..... (Type) ..... (Capacity) .....
CARPETS: (Mfgr.) ..... (Type) ..... (Color) ..... (Tile) .....
CHAIRS: (Mfgr.) ..... (Model No.) ..... (Type Back) ..... (Type Seat) .....

PROSCENIUM: (Height) ..... (Width) ..... (Depth) ..... (Above Floor) .....
CURTAINS: (Length) ..... (Width) ..... (Color) .....
SCREEN: (Mfgr.) ..... (Masked Size) ..... x ..... (Full Size) ..... x .....
CURTAIN CONTROLS: (Mfgr.) ..... (Model) ..... (Capacity) .....

MISCELLANEOUS:



DAILY BOXOFFICE STATEMENT No.

Theatre ... Day of Play ...
Feature ...
Opposition ...
Checker ... Hours ...

MATINEE • TICKET NUMBERS	No. SOLD	TAX	TAX TOTAL	ADM.	ADM. TOTAL
Close / Open					
Close / Open					
Close / Open					
PASSES & WALK-INS (Highest Tax Scale)					
Close / Open					
WEATHER: MATINEE TOTALS					

EVENING • TICKET NUMBERS	No. SOLD	TAX	TAX TOTAL	ADM.	ADM. TOTAL
Close / Open					
Close / Open					
Close / Open					
Close / Open					
PASSES & WALK-INS (Highest Tax Scale)					
Close / Open					
WEATHER: EVENING TOTALS					
GRAND TOTALS for the day					

Cashier's Signature ... Date ...

FORM No. 5
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JAY EMANUEL PUBLICATIONS, INC.
1223 Vine Street, Philadelphia, Pa.

HOURLY TICKET SALE RECORD

HOUR	TICKET No.	No. SOLD	TOTAL	TICKET No.	No. SOLD	TOTAL	TICKET No.	No. SOLD	TOTAL

CASH RECEIPTS (Itemize Back)

Total Miscellaneous Receipts
Total Admission Receipts
TOTAL RECEIPTS FOR DAY

DEPOSITS		REMARKS
Regular Account		
Special Fund Account		
TOTAL DEPOSITED		

All entries on this statement have been inspected and approved by

(Manager's Signature)

THE DAILY BOXOFFICE STATEMENTS provide on the obverse (left) for the statement number, the feature, the day of the run, the opposition, and the checker's name, along with the closing and opening ticket numbers for each price, the number of each sold, the rate of tax and the total tax on each price, the net admission, and the total admissions at each price. On the reverse (right) space is provided for the hourly records and other data.

conditions which are often responsible for an abnormally high or abnormally low gross.

Equipped with holes for saving in a standard ring binder, the bottom of each sheet provides space for the cashier's signature and at the lower right corner the date. The location of this latter is important if all daily statements are to be saved and referred to at later dates.

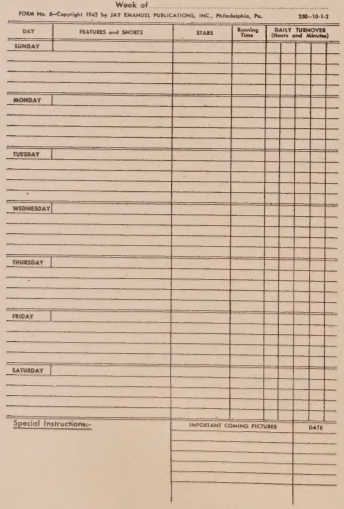
On the reverse side is an Hourly Ticket Sale Record which provides spaces for as many as ten spot checks of the hour of the day, the number of the current ticket, the number sold since the last check, and the total income since the last check. Such knowledge is important in discovering adult or children's admission totals for any day, hour or show; as well as shifting responsibilities of relief cashiers; etc.

Here ends the portion of the box-office statement that is kept all day by the cashiers and in the box-office.

After closing of the box-office for the day, and when the cashier brings her funds and records to the manager's office for the daily check out, the following totals are added: (1) individual totals of all other income from vending machines, candy counter, advertising slides, or parking, (2) total admission receipts from the front of the sheet; and, as a result, (3) total recepts of all kinds for that particular day. Also entered on the reverse side is the manner in which this income will be deposited; whether (1) regular checking account, (2) tax account, (3) home office withdrawal account, or (4) any other special fund account that the executive has set up. If so desired, any cash paid out of the day's receipts can also be covered under the heading of "Remarks" and subtracted from the deposited total.

When all of this income knowledge for the day has been entered and checked, the manager or executive signs the last line indicating that all totals have been inspected and approved by him and he accepts the responsibility.

PROGRAM AND RUNNING TIME SCHEDULES, miniatures of the booking sheet, show a theatre's program for the entire week, with the actual time schedules on each day's show. Space for special notes is provided.



PROGRAM AND RUNNING TIME

Week of

FORM No. 6—Copyright 1942 by JAY EMANUEL PUBLICATIONS, INC., Philadelphia, Pa. 330-10-1-2

DAY	FEATURES and SHORTS	STARS	Running Time	DAILY TURNOVER (Hours and Minutes)			
SUNDAY							
MONDAY							
TUESDAY							
WEDNESDAY							
THURSDAY							
FRIDAY							
SATURDAY							

Special Instructions:—

IMPORTANT COMING PICTURES — DATE

Petty Cash Vouchers

As prepared by THE EXHIBITOR, every single item of expense that is paid for in cash should be signed for by the cash recipient, on a special consecutively numbered separate voucher showing (1) the date, (2) the amount, (3) the purpose or a description of the merchandise purchased, and (4) the account to which it should be charged; and each such voucher should be accompanied by a receipted invoice, cash slip, or other evidence to substantiate the voucher amount. Each voucher should also be countersigned by the manager or executive to indicate his approval of the payment.

Once each week, so that voucher slips may not be mislayed when needed at some later date, and so that only a lump petty cash total for the week need be entered in the permanent bookkeeping records, all slips should be collected in the order of their consecutive number, and inserted in an envelope bearing that week's date. Under THE EXHIBITOR'S system, the envelope used would show: (1) the week-ending date, (2) the number of the vouchers inside, (3) the week's total, (4) the number of the reimbursing check that was drawn, if paid from a special fund, and (5) the initials or the signature of the managing or auditing executive. Space is also provided for an individual listing of each voucher number, description of purchase and individual amount on the face of the envelope, in order to make easy any later reference.

Weekly Payroll Form

Again because it is usually covered by one reimbursing check and can be entered on the permanent bookkeeping records as a single item of expense, it has been found advisable to keep a breakdown of all payroll data on one special form that can be easily kept and filed. This has been found particularly true under present requirements of Social Security numbers, maximum work weeks, overtime for more than 40 hours, and withholding tax, old age benefit, group insurance, war bond purchase, or other deductions. The turn over in employees and the comparatively short periods of employment by many of them makes a separate account for each impractical.

To answer this need which would only require 52 payroll forms each year for any one theatre, THE EXHIBITOR has prepared a Weekly Payroll Form which is modeled after the ones currently in use by most large theatre circuits. This form includes spaces for all of the needed records specified above, together with a flap which, while covering over the amounts paid to other employees, provides a space for the acknowledging signature of each particular employee opposite his own salary line. The whole form folds down to the normal letterhead size of 8½ x 11 inches so that it can be easily filed away in any standard filing cabinet for future reference.

Space is also allowed for the manager's or executive's explanation of all overtime, and for signaling salary increases or bonuses that might be paid to a particular employee for some outstanding job. Carefully and completely kept, this form provides all of the payroll data required by the various government bureaus.

• speaking of SERVICES!

THIS IS THE *ONE AND ONLY* THEATRE TRADE JOURNAL PUBLISHED *EXCLUSIVELY* FOR THE SERVICE OF THE EXECUTIVE THEATRE MAN

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A Weekly Trade Journal by the Publishers of THEATRE CATALOG

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FORMS and SYSTEMS

— for the Theatre Executive

Specially Designed for —

- BUYING and BOOKING
- MAINTENANCE and MANAGEMENT
- BOOKKEEPING and CASH CONTROL
- TAX and PAYROLL RECORDS

2500 Theatre Men Use Them!

Read On! And see why!

(ALL PRICES MARCH 1, 1946—SUBJECT TO CHANGE)

1 "THE SERVICE-KIT" FORMS

(Item No. B.S. 1)

A streamlined system for Film BUYING and BOOKING.

Price (per set): 75c

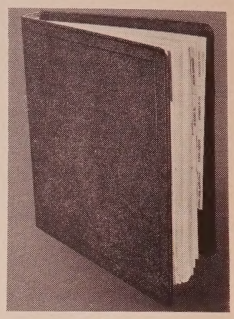
- Arranged and assembled for insertion in any standard 9 x 12 inch ring binder or ring-equipped brief case are the following forms:

1. A 52 week supply (52 pages) of large, modern BOOKING SHEETS
2. 10 pages of AVAILABILITY and PLAY-OFF WORK SHEETS
3. 24 pages of CONTRACT CONTROL ("Cut-Off") RECORD SHEETS
4. A permanent EQUIPMENT RECORD
5. An 18-month BOOKING CALENDAR
6. A special PERPETUAL CLEARANCE CHART and many other helpful forms all properly indexed

- After the first year, additional pages of any particular FORM can be purchased separately for 1c per sheet; any back REVIEW SECTION for 2c; and any DIVIDER INDEX for 10c.

2 The Service-Kit RING BINDER

(Item No. B.S. 2a)



- A 3-Ring, Stiff-backed, Loose-leaf Binder made by the famous ROYAL LINE, especially for SERVICE KIT requirements. STURDY! SERVICEABLE!

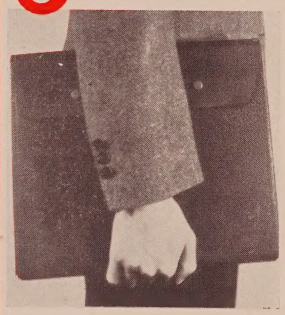
- For the theatre executive who is proud of his business and wants to keep business-like records in a neat and orderly manner, this 10½ x 12¾ inch ring binder is the perfect answer. A stiff board cover bound in dignified dark blue, levant grain FABRICOID, houses a sturdy, standard, 3-ring clip.

- This binder is large enough to hold Review Sections properly indexed for one complete season, plus Booking Sheets, Contract Control and Cut-off Sheets, Availability Work Sheets, and the other forms that are indispensable to modern systemized buying and booking.

Price (without forms): $1.25 each

3 The Service-Kit BRIEF CASE

(Item No. B.S. 2b)



PRE-WAR STOCK AND NOW IMPOSSIBLE TO REPLACE.

While they last.

Price (without forms): $1.60 each

- If you are the executive of a successful theatre or small chain of theatres, you owe it to yourself and to your business to look like a successful business man. When arranging your bookings, buying blocks of product, and visiting your exchange center, keep your forms and records in a neat, orderly, executive brief case designed for this purpose.

- Here is a compact, folded brief case of sturdy leatherette, equipped with a standard 3-ring clip, and opening out flat for desk use. It contains two interior pockets for the safekeeping of papers and checks . . . together with a holder for the booking pencil.

4 SERVICE MANUAL for Employees

(Item No. B.S. 3)

- Of inestimable value in "breaking-in" a new staff of Ushers; a new Cashier, or a new Door Man.

- This 16 page pocket size (3 x 6 inch) booklet with heavy paper cover itemizes the rules of conduct for the theatre staff very logically and thoroughly. Separate chapters are devoted to Managers, Cashiers, Door Men, Ushers, etc., as currently trained in the larger circuits.

- It also pictures a system of Usher's hand signals for designating empty seats and gives many hints on Public Safety, Accident, Fire Prevention, and Advertising, etc.

BETTER MANAGEMENT with TRAINED Employees.

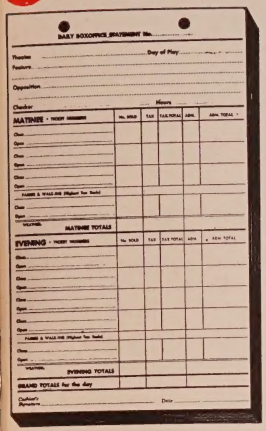
Price: 5c each or 25 for $1.10

ALL SALES LIMITED TO THEATRES

All sales prepaid — but sold under a money-back guarantee of satisfaction

5 BOX OFFICE STATEMENTS

(Item No. B.S. 5)



● Printed on both sides so that complete factual totals for one day can be kept on one 8½ x 5½ inch sheet, each itemizes:

1. OPENING AND CLOSING TICKET NUMBERS
2. PASS AND WALK-IN TICKET NUMBERS
3. CASH TOTALS
4. TAX TOTALS
5. PROGRAM, WEATHER, AND OPPOSITION
6. SPACES FOR HOURLY TOTALS
7. MISCELLANEOUS INCOME AND DEPOSITS

● Made up in pads of 50 per pad, each sheet is punched for saving in a standard ring binder with the date at the lower right corner for quick reference when filed.

50 SHEETS PER PAD AND PUNCHED FOR RING BINDER

Price (per pad): 25c each

or 10 pads for $2.00

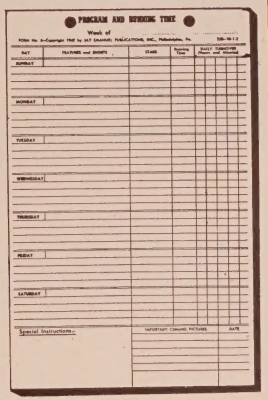
6 WEEKLY PROGRAM SCHEDULES

(Item No. B.S. 6)

● These forms are prepared for convenience in disseminating accurate information to the key member of a theatre staff so that they may answer intelligently the patron questions most frequently asked; or so that they can cue and time their show.

● Daily turnover running times can be easily computed from the running times of the individual subjects that make up the bill.

● One copy each week: (1) on your desk, (2) to your cashier, (3) to your doorman, (4) to your projectionist, and (5) to your head usher or floor supervisor will be sufficient to keep uniform information throughout the theatre.


PROGRAM AND RUNNING TIME

Week of

DAY	FEATURES and SHORTS	STARS	Running Time	DAILY TURNOVER (Hours and Minutes)
SUNDAY				
MONDAY				
TUESDAY				
WEDNESDAY				
THURSDAY				
FRIDAY				
SATURDAY				

Special Instructions:

IMPORTANT COMING PICTURES | DATE

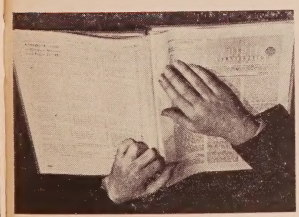
50 SHEETS PER PAD AND PUNCHED FOR POSTING

Price (per pad): 25c each

or 10 pads for $2.00

7 The FINGER-TIP FILE

(Item No. B.S. 7)



An exclusive method for permanently filing Reviews without fear of loss when you are later looking for RE-ISSUE POSSIBILITIES.

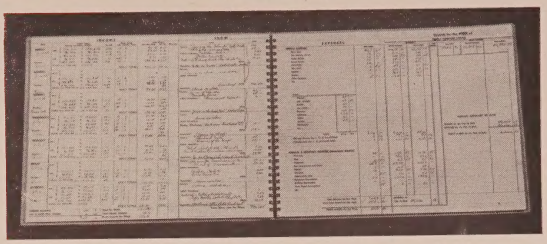
Price: 55c each

Back Review Sections: per section, 2c each additional

● Each stiff backed file contains 26 bound-in adhesive strips protected by waxed muslin covers. As each consecutively numbered Review Servisection of THE EXHIBITOR is published, merely pull down the protective cover strip and press the section to the fresh adhesive. (No scissors or paste necessary). You will find that it grips with tenacity of surgical tape and the pages themselves will tear before the adhesive will loosen. For a permanent file of reviews of all features and shorts, to be saved for current and future reference, no ring or other method can equal this adhesive feature.

8 "At-a-Glance" BOOKKEEPING BOOK

(Item No. B.S. 8)



Price per book (sufficient for 52 weeks): $1.00

● Specially designed by WILLIAM A. LEVICK COMPANY, specializing C.P.A.'s in theatre accounting, for the exclusive use of subscribers to THE EXHIBITOR, this system has been constantly revised to meet each tax or other changing requirement of the theatre man. Its 9 x 12 inch pages provide for: (1) daily ticket record, (2) tax collected daily, (3) daily gross, (4) pass and walk-in records, (5) weather and opposition, (6) daily show cost, (7) weekly income from vending machines, etc., (8) weekly gross, (9) weekly fixed expenses, payroll, and annual of monthly expense amortized weekly, (10) weekly profit or loss statement, and (11) profit or loss for the year to date.

9 Weekly PETTY CASH SYSTEM

(Item No. B.S. 9)

Prices:

Voucher Pads (100 to the pad): 20c

Special Envelopes: 50c per 100

A specially designed 3x5 inch voucher slip — and a special envelope to prevent their loss.

● Petty Cash Slips require a counter signature of approval and are numbered consecutively so that accurate records can be kept of each individual expenditure.

● The specially designed envelopes are for use only once each week in listing each individual slip and computing the weekly total expended. All slips listed on a particular envelope should then be inserted in it for safekeeping; and the envelope filed for future reference.

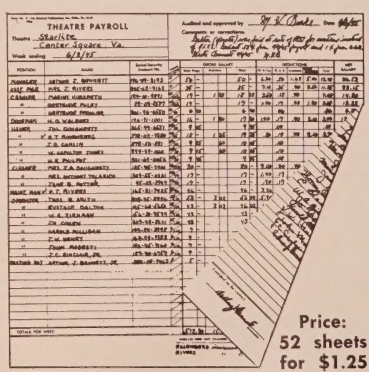
● There can never be any later question of a particular disbursement, for the actual receipt is always on hand and easily located.

10 Weekly PAYROLL FORMS (Item No. B.S. 10)

The system that is modeled after those in use by most major circuits.

● Designed to be filed in the ordinary letter-head size cabinet (8½ x 11 inches) this form provides a permanent weekly record of the individual name, social security number, rate of pay, overtime pay, reasons for overtime, and deductions for all purposes. It also provides gross weekly totals of salaries, deductions, raises, etc. One of the most important features is an individual signed receipt by each employee, without their being able to see what any other employee has earned.

● Such an auditable form is for the benefit of the manager and the owner.


THEATRE PAYROLL

Theatre Starlite

Center Square, Va.

Week ending 6/24/55

Price: 52 sheets for $1.25

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Please send check, money order or stamps in proper amount with each order!

. . . may this Trade Paper be of SERVICE to *YOU?*

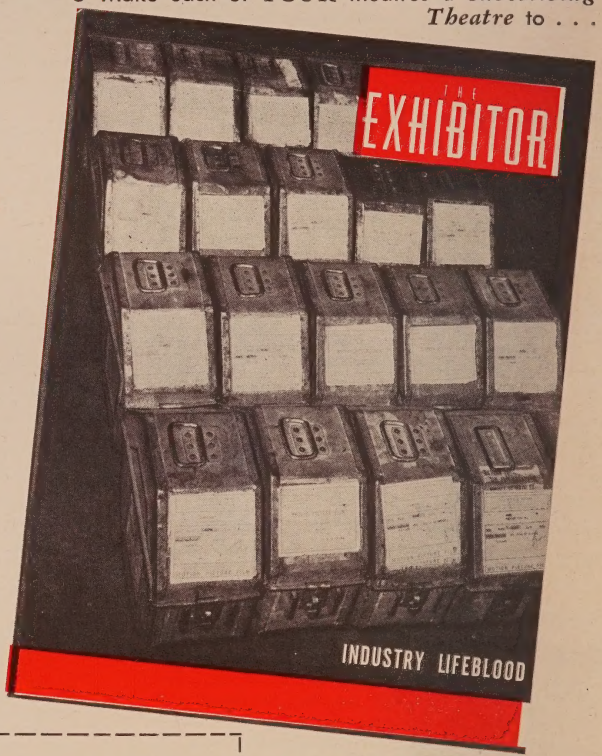
- THE EXHIBITOR will bring to you a bright, fresh slant on all industry news and events, that will permit you enjoyable and swift reading, in order to keep abreast of developments.
- THE EXHIBITOR will tell you most of the important developments in pictorial style for vivid, thorough understanding.
- THE EXHIBITOR will bring you the best and most thorough service features in the form of: (1) SKILLED AND COMPLETE REVIEWING, (2) CAREFUL INDEXING OF *ALL* FEATURES AND SHORTS, (3) THE "TIP-OFF" ON HOW FEATURES ARE GROSSING, (4) CHARTS OF COMING FEATURES, and (5) ALL CURRENT ADVERTISING AND EXPLOITATION AIDS.

THE EXHIBITOR will also bring you a clear-eyed theatre man's view in its virile editorials on current industry matters that affect the theatre.

WON'T YOU TRY IT OUT BY SUBSCRIBING — NOW!

MAIL THIS BLANK TODAY

- All of the **FORMS AND SYSTEMS** described in the preceding pages have been specially designed and tested in actual theatres before being offered for sale *to Subscribing Theatres.*
- They are then printed or fabricated in huge quantities, in some cases as large as 100,000 run, in order to obtain a small unit cost — and this saving is passed on *to Subscribing Theatres* for the relatively small quantities they need each year.
- The warehousing facilities and shipping room staff of THE EXHIBITOR BOOK SHOP are then turned to the service of these *Subscribing Theatres* in order to rush all orders to them properly wrapped and labeled.
- Make each of *YOUR* theatres a *Subscribing Theatre* to . . .



GENTLEMEN:

You may enter my Subscription to THE EXHIBITOR.

Enclosed find: $2.00 for 1 year ☐; $5.00 for 3 years ☐; or bill me ☐.

I would also like to see actual sample sheets of No. .....

THEATRE or FIRM NAME .....

MAILING ADDRESS .....

CITY ..... (P.O. Zone) ..... STATE .....

If you wish this addressed to an individual, please fill in the following:

NAME ..... TITLE .....

We KNOW you'll like and use it!

Check Books with Numbered Stubs

As the final permanent record of all major expenditures, checks should be used and, after being honored and returned by the bank, they should be carefully checked against their stubs. Some super-cautious theatre executives get out the paste pot each month and paste the cancelled check to its old stub as a proof of payment should need arise in the future, but such a procedure is not necessary so long as cancelled checks are saved somewhere, so that they can be found when needed.

The check stubs, however, are an important part of a simplified bookkeeping system. Each stub should fully describe the purpose for which the check was drawn, to whom it was drawn, the date and the exact amount. All deposits should also be entered showing the date, amount, and source of the income.

In the event of later inquiry by a government bureau or if only by some film company, such stubs can pretty definitely prove clean hands.

The Permanent Bookkeeping Book

Any business of any size, and doing any profit-and-loss commercial enterprise, is required by law, if not by common business sense, to keep a permanent bookkeeping system. Mistakes are often made by keeping a too exhaustive, and too expensive in either time or employe, set of records; but the usual and most common mistake is the keeping of records which are inadequate by lack of form or attention.

Recognizing the need of theatre executives for some simple, yet thorough system which would not require too much time, by day or by week to maintain, THE EXHIBITOR back in 1934 had prepared and made available to its subscribing theatres the At-a-Glance Bookkeeping System. This system includes much of the data outlined in the Daily Box Office Statement, Petty Cash System, Weekly Payroll Form, and Check Book Stubs mentioned above, but if such individual records are maintained, the actual bookkeeping can be streamlined to a weekly entry of their individual totals that shouldn't require more than ten minutes per week. For example, provision is made in this permanent system for the entry of daily ticket numbers, daily tax totals, and daily net admission income, broken down on an individual ticket price basis, that could be obviated by simply marking in the number and day of the Box Office Statement where this breakdown appears and entering the gross, all-day, totals. Again, while provision is made for a payroll breakdown for the week, if the Weekly Payroll Form is used, only the date and grand total need be recorded.

Detailed provision is made, however, for the entry of all film costs, advertising, services and other management items; for all annual and monthly expenses of electricity, heat, telephones, insurance, dues, and so forth; and for the items of depreciation and amortization that have been funded.

.... Theatre

PETTY CASH SUMMARY

For the Week Ending ....

Containing Vouchers No. .... To ....

Total Amount .... Paid by Check No. ....

AUTHORIZED BY ....

Form No. 9

COPYRIGHT 1942 BY JAY EMANUEL PUBLICATIONS, INC., PHILADELPHIA, PA.

VOUCHER No.	DESCRIPTION OF PURCHASE	AMOUNT
	TOTAL PETTY CASH	

PETTY CASH VOUCHERS and envelopes in which to file them are available. The voucher itself (right) should be filled out for every single item which is paid for in cash. It provides space for the name of the theatre, the date, the amount (in words, as well as in figures) disbursed, the item involved, how the amount should be charged in the theatre's books, the signature of the one receiving the money, and the signature of the approving official. The Petty Cash Summary (above) is a standard No. 10 envelope, holding a week's accumulation of petty-cash slips. Space on the front of the envelope is provided for the voucher number, description of purchase, the amount of each, and the total, together, of course, with a summary of these data for easy reference.

PETTY CASH VOUCHER — № 30803

.... Theatre .... Date

Received the Sum of ....

For ....

....

Charge ....

This Voucher must be signed and accompanied by receipted invoice, cash slip or other evidence of the amount paid having been received by the vendor. If a Voucher is voided because of mistake or accident, enter its number on the PETTY CASH SUMMARY jacket and mark "Void," and attach such voided vouchers in its numerical sequence.

By ....

Approved by:- ....

THE PAYROLL FORM includes spaces for all of the records, such as Social Security numbers, maximum work week, overtime, withholding tax, old-age benefit, group insurance, and other authorized deductions, as shown at the left. So that the sheet can be used for the entire staff and be signed individually, the while not revealing the personal details of any person's account, the right-hand quarter of the sheet folds back over the critical figures, leaving visible only the four left-hand columns of the sheet. At the right is shown the reverse, with the space for the employe signatures. Since explanation for overtime and such would not be needed, as a rule, for all employes, fewer spaces need be provided. Thus, on this one sheet, which can be easily filed in the office, are all the facts necessary.

THEATRE PAYROLL

Theatre ____________

Week ending ____________

Audited and approved by ____________ Date ______

Comments or corrections:

POSITION	NAME	Social Security Account No.	HOURS RATE	GROSS SALARY			DEDUCTIONS					NET SALARY
				Basic Wage	Overtime	Total	W. H. Tax	O. A. B.	Insurance	Other	Total	
TOTALS FOR WEEK												

INDICATE HERE ANY CHANGES FROM PREVIOUS WEEK IN INDIVIDUAL BASIC SCALE AND CHECK √ NAME ABOVE

We hereby acknowledge receipt of payment in full for all services rendered to this theatre during the period indicated opposite:

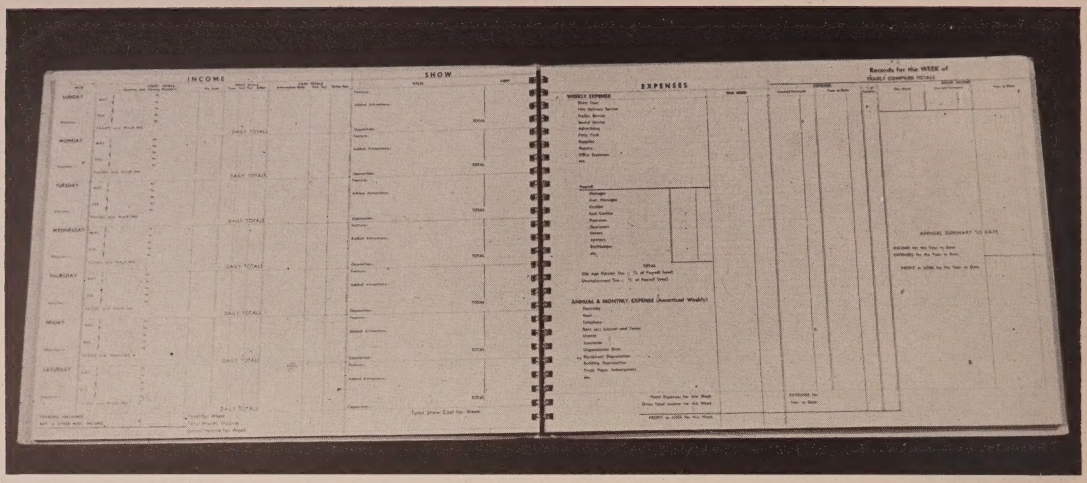
Record and Explanation of

OVERTIME

EMPLOYEE SIGNATURES	NAME	POSITION	EXPLANATION	AMOUNT	APPROVED BY

Certified to be correct:

____________ MANAGER



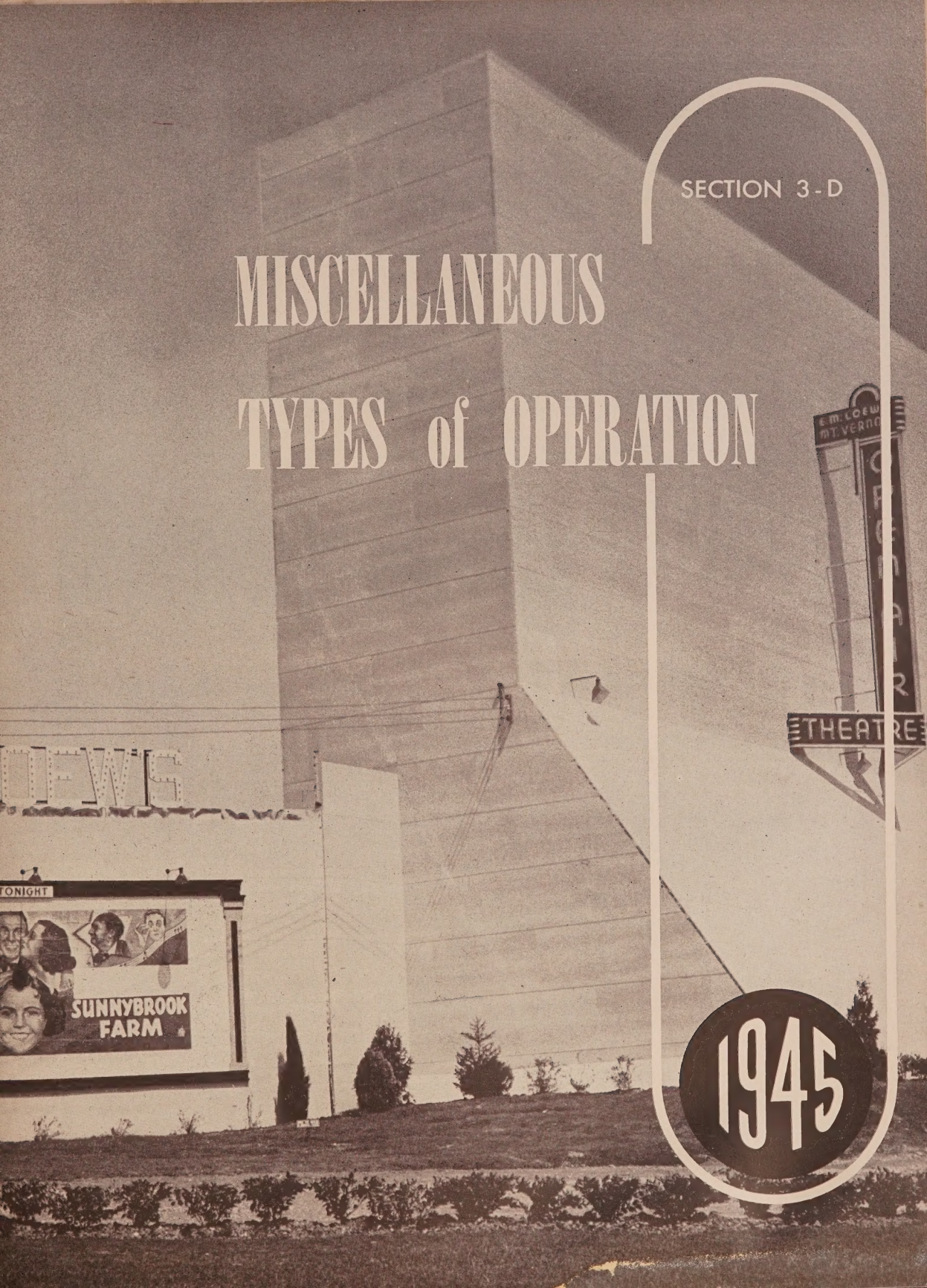
THE PERMANENT BOOKKEEPING BOOK provides space, on the left-hand page, for such details of income as ticket totals (with opening and closing ticket numbers), the number sold in each price class, the net, tax, other charges levied, and the totals on admissions only, the federal tax, and other taxes. At the week's end, provision is made for receipts from vending machines, advertising, and other miscellaneous sources, and for the gross income. Also on the left page are spaces in which to list the attractions (as well as opposition) and their cost for each day of the week. On the right-hand page is the space for the expenses, broken down into its various elements, together with such annual and monthly expenses as are amortized weekly. Also on this page is space for the year's cumulative totals.

Of major importance in this permanent book is the ability to carry over profits and losses from week to week so that at the end of any one of the 52 weeks in a year, it is possible to strike an accurate profit and loss statement to date.

Either separately or combined with the other forms and methods, this is believed to be the simplest system of adequate theatre bookkeeping yet devised.

CONCLUSION

Regarding all of the forms, systems and methods described in the above, it must be remembered that the problems and requirements of no two theatres are exactly alike and what may fit one exactly may need revision or adaptation to fit another. No two methods of doing business are exactly alike so it is obvious that the recording of the successes or failures of all methods could not possibly be alike. It is certain, however, that real study extended over a long period of years and researching the methods in practical use by a great number of theatres, has pointed up the above as the near or typical. From this point on, the matter rests with the particular executive who has already demonstrated his ability to do his own job best.


SECTION 3-D
MISCELLANEOUS
TYPES of OPERATION
THEATRE
TONIGHT
SUNNYBROOK FARM
1945

Unused Roof Space Turned into Profit Area

Creation of a Roof Garden Utilizes Space For Developing Good Will - - - and Profits

Many times in the smaller theatres, there is considerable space seemingly lost to constructive purposes above the second-story level and in front of the high rear wall of the auditorium box.

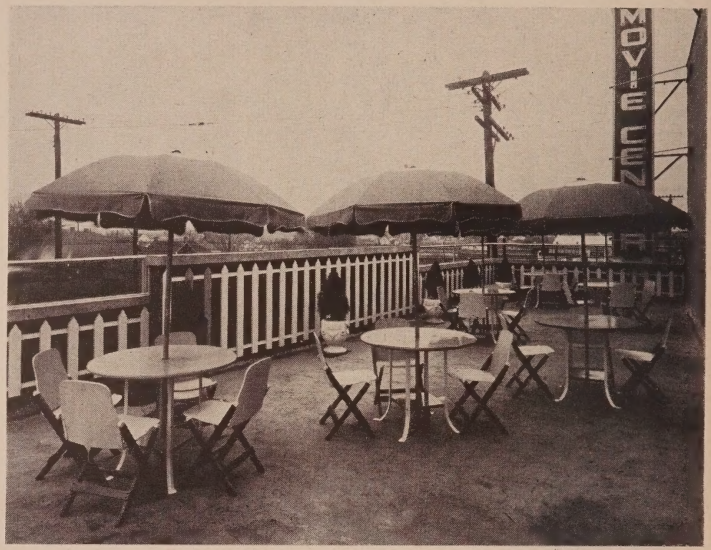
In the Reese Theatre in Harrington, Delaware, owner Reese Harrington and architect William Lynch Murray (of Harrisburg, Pennsylvania) have combined ideas and talents in such a way that there is utilized all that space which many another theatre quite overlooks.

In front elevation, the Reese Theatre is a nice, smart, modern cinema, but built quite to what one might almost consider to be a conventional pattern for houses in communities of a couple of thousand souls. The island box office is in the center of the entrance way, with a store on either side.

Nor are the stores of different ilk from that would be expected in such a spot, particularly since the project bears the communal title of Movie Center. Indeed, with the increasing sales of refreshment items in the theatre and the equally increasing development of similar commercial ventures in association with the theatre, it would have been astounding if the Movie Center Snack Bar had not been included!

Thus far, the plan is quite orthodox—and as laudable as it is excellently executed in perfect symmetry. At this point it was realized that, naturally, a considerable investment had been made—and that there was an area of appreciable dimensions that was not bringing into coffers any return for the moneys spent in creating it. It was the space in front of the theatre's rear wall, comprising actually the roof over the two-story structure that meets the building line.

What to do? Might not this space be made to produce revenue? And then Owner Harrington and Architect Murray had an idea. Yes, a roof garden, no less!



THE ROOF GARDEN of the Reese Theatre is a distinct novelty which brings to an area of the theatre structure, formerly ignored as a revenue producer, utility and great service as a builder of community good will — and nice profits for the theatre management.

THE REESE THEATRE, Harrington, Delaware, is typical of many a modern theatre in small American communities, with its centrally placed box office and entrance and the store on either side. Likewise typical of the times is the snack bar and the "Center" idea.

And why not! Here, indeed, was the perfect set-up: They have the space, and, through the Snack Bar on the street level, they had the stock-in-trade.

And so it was that the Reese Theatre became, so far as is known, the first cinema to have its private roof garden, a place where, of a summer's evening, the young in heart of all ages may relax in the informal atmosphere of an outdoor tea room at a resort and a sidewalk cafe in the Montmarte all rolled into one—and only a few blocks from home!

The architectural and constructional details are not available, but it takes no imagination to picture dumbwaiter service between the Snack Bar and the roof garden, and the necessary connections with the theatre that make the two operations one.

Such a development would not, of course, have to tie in directly with the theatre, although it could be that the place might be made so generally appealing that theatre admission would be almost construed as "cover charge" and the screen entertainment a "floor show"!

A venture such as this can hardly fail, and it can be a potent factor in creating good will for the theatre—and a profit for the management!

The Theatre Home for the Theatre Owner

Bringing Home and Business under One Roof Establishes New Design for Modern Living

In the American way of life, there are two principles which, in their broadest, highest terms, may be summarized briefly in two little words: Home, and Work.

However complete and unified a person does make this whole design for living, it rarely becomes possible to consolidate it to the point that both Home and Work converge upon and find physical expression in the same structure.

But that is precisely the situation we consider here: An architectural design for living which brings under the same roof both Home, and Work.

THE BACKGROUND

Famed throughout northwestern New York for their theatres and other ventures are the Basil brothers, a fraternal solidarity which started a score of years ago, when Constantine, Basil, Nicholas, and Theophilos Basil expanded their business activities to include motion-picture theatre operation.

The first break in that closely-knit organization came two years and a half ago, when, as it must to all men, death came to Brother Nicholas. Even before this, however, Nick Basil and his brothers were planning a theatre to be located at Colvin and Kenmore Avenues, in Kenmore, a suburb.

And even then the brothers were toying wth an idea whose germ goes back more than twenty years when Constantine Basil observed the late, great Michael ("Mike") Shea checking a picture from a side box in one of his theatres. Why didn't he have a center box especially reserved for himself? Or better yet, why not a private projection room?

Time marched on—but the idea stuck. Thus it was that when what would become the Colvin Theatre was on the boards, it all came back to him.

Why not, Constantine reasoned, combine the two, with the theatre and its necessary rooms (except for the projection booth) on the first floor and, on the second floor, an apartment which would take advantage of many of the principal walls necessitated in the theatre's construction? Why not? There was no good reason why not—other than the fact that no one had ever done such a thing before!

So, precedent-breaking being nothing very new to the Brothers Basil, that mental hazard was easily swept away by the simple expedient of deciding actually to unite Home and Work in a single structure.

Niagara Falls' brilliant architect, Russell Goodwin Larke, was called in to create this new facet on the gem that is the great American home.

That Russell Larke was the man was decided on his non-theatre record, as well as the fact that he, in association with Simon Larke, had designed, but a short time before, the company's LaSalle Theatre, in Niagara Falls.

My Theatre Home for the Theatre Owner

The Lady of the House Speaks Her Piece About This Unique Home-within-a-Cinema

By MARY BASIL
(Mrs. Constantine J. Basil)

On numerous occasions I have been requested to jot down the important facts of my home, and shall do the best I can to describe "our theatre within a home" and "our home within a theatre".

We started out to combine the theatre and home to make things easier for both of us, and we believe we have created an idea that has not been done anywhere else in the entire country.

In the description of our home, we have all conveniences ultra modern and our friends think it is strictly an innovation in home and theatre building. We wanted everything comfortable, as well as mechanical, and we have just that! It is not difficult to do that—in fact it is quite simple. With plans laid well, and the able assistance of a good architect, things just worked out fine.

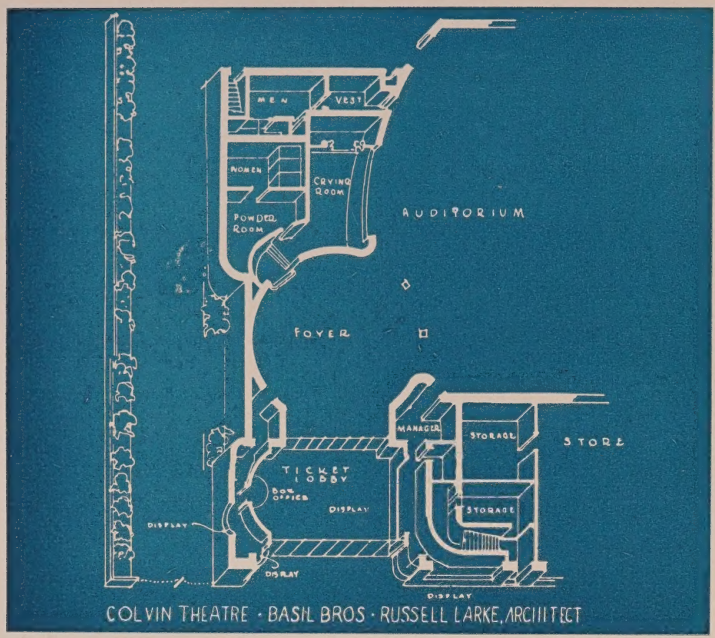
We have a maid's quarters in the rear of the floor, with a hall dividing the kitchen. I thoroughly enjoy working in my kitchen which is so compact with ample cupboard space, electric refrigerator, and built-in sink on which is a drainboard. With a simple lift of the hand refuse is deposited and that is the last we see of it. Each night the janitor enters the back hall, waste is removed through a panel in the rear hall wall and sterilized container replaced. At the north end of the kitchen is the electric range, mirrored from the top of the stove to the ceiling, and more cupboards. The walls and entire ceiling are covered with a heavy inlaid linoleum, which signifies easy cleaning.

One of the main features of our dining room, which seems to fascinate our guests, is the semi-circular movable bar which with a touch of the finger may be moved on rainy or wintry days.

Our living room is circular and is decorated in light delicate colors to match the furniture and rug. This room includes a fireplace and a music alcove, one of the main features, of course, in this room is the "theatre within a theatre." Suffice to say that our guests and ourselves are able to view the current picture being shown in our theatre below us right from our living room.

We have two major bedrooms, each with bathroom, showers, and so forth. Light brown and blue are the dominant colors throughout the apartment that we enjoy so much.

From the foyer, a passage leads to the terrace, which is situated on the roof of the stores below, surrounded on one side by a concrete wall and on the other by a white picket fence. With comfortable deck chairs, chaise lounge, and the stars as our roof, happy summer evenings are spent here. In the daytime, our grandchildren relax and enjoy themselves in the pool, which is decorative as well as entertaining. In its center is an artistic running fountain. Flower boxes with a profusion of blooms adorn the whole wall. A marble bench with potted plants sits in one corner. Marble statuary is placed at various spots around the terrace. An outdoor grill provides us with the means to have most of our meals in the summertime on our terrace.



FIRST-FLOOR PLAN OF THE COLVIN THEATRE

THE TIE-INS

With a lot measuring 400 feet wide by 104 feet deep, and the development to provide for some stores, too, it was easy for Russell Larke to set his basic plan: to place the main axis of the auditorium parallel to the street, with the stores backing up to the auditorium, and the theatre's entrance and miscellaneous rooms across the left end of the structure.

Bearing in mind that the second floor would be the apartment, all theatre rooms, public and private, excepting the projection room, would have to be on the street level. Thus set, a circular foyer seemed to Planner Larke the logical connecting link between the outer, or ticket, lobby on the one side and the retiring rooms off to the other.

So, with the basic plan set for the theatre floor of the building, it was obvious that the logical shape of the living room of the apartment—which would, in the natural order of design be directly over the foyer—should be round, too. And so it was, with Architect Larke continuing the walls of the foyer through the second floor, that the living room came into being.

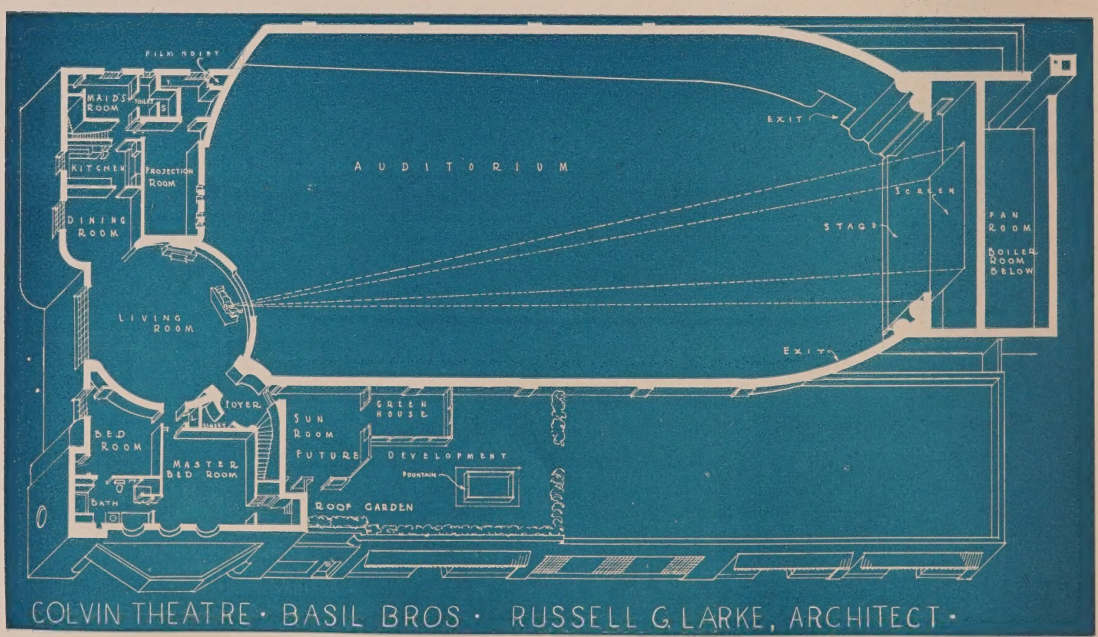
When the crying room was set in, Architect Larke designed it so that the rear wall would be continued through the second floor, to form the rear wall of the projection room. Thus were the limiting walls set to utilize the maximum structural features of the dual design.

With the living room definitely established, and the actual over-all space indicated for the other rooms, Architect Larke did not find it difficult to fit together a series of rooms which would be arranged for convenience and, at the same time, for efficient operation.

The construction of the common wall, between the living room and the theatre auditorium, Designer Larke states was not materially different from other walls of the auditorium. It is made twelve inches thick of cinder blocks, with, on the theatre side, velour covering a two-inch-thick facing layer of rock wool, and on the living-room side, faced with a gypsum plaster.

With the theatre auditorium being on the other side of the wall from the living room, a brilliant idea came to Russell Larke: why not knock a hole in this common wall, put in a window, and then the pater familias, with his family and

SECOND-FLOOR PLAN OF THE COLVIN THEATRE, SHOWING HOW THE BASIL APARTMENT TIES IN



guests, would, in the privacy of their own home, be able to watch the picture being screened at the Colvin Theatre?

And so it was that Constantine Basil's residence became the first in history to have a living room with theatre attached

THE HOME

In architectural annals, there are, of course, instances where apartment buildings have been constructed in conjunction with theatres and even residential penthouses atop office buildings in association with theatres, but never before, so far as is known, have a theatre and a home been so intimately designed and constructed.

Having a viewing window in the living room, however, presented a couple of problems. When the window is installed, what would prevent light from streaming into the auditorium from the living room, and how about the audience's being able to see into the apartment?

The solution to these questions, actually, presented no especial problem at all to Russell Larke.

The window he designed is a fixed light of quarter-inch plate glass. On the apartment side, he put solid plywood shutters three-qquarters of an inch thick. When closed, these shutters form a tight panel in the living room, finished to blend with the general decorative scheme.

In wiring the living room, Problem-Solver Larke has arranged that all fixtures, which could possibly throw light through the viewing window, would be tied through one switch, which would automatically extinguish all that light whenever the shutters are opened. Thus was prevented the accidental lighting of the auditorium from the apartment, as well as forming a safeguard against an unwanted display of the apartment to the theatre audience.

The normal furniture complement of the room provides for three comfortable stuffed chairs in front of the viewing window. Other chairs, of course, can be placed in the sight lines, if the Basils are entertaining a lengthier guest list.

The extension of the theatre's monitor system offered no problem, but Architect Larke, always with an eye to good taste and the niceties of appearance, did hide the apartment"s speaker system behind the sliding doors of built-in-wall cabinets.

Thus it is that Constantine Basil becomes the industry's first theatre owner to blend all the finer attributes of home life and motion-picture exhibition!

Sleeping quarters for the Basil menage are at the front of the building. Off the living room—about a quarter of a circle clockwise from the viewing window—is a tiny foyer, straight through which is the master bedroom and, to the left from the little foyer, a second sleeping room. Between the two, in the corner of the building, is the fully tiled bath, complete with tub and shower.

At the side of the building, off the living room, opposite the dormitory section, is the gastronomics department, the dining room, back of which is the kitchen. Both the kitchen and the dining room sidle up to the rear wall of the projection room.

The domestic situation was not forgotten by Architect Larke, for in the rear left corner of the building, on the

THE PORTAL OF HOSPITALITY

SPACIOUS DESIGN FOR GRACIOUS LIVING

THAT OF MORPHEUS WAS NEVER LIKE THIS

ANOTHER CORNER OF A ROUND LIVING ROOM

LIGHTS OUT . . . PANEL OPEN . . . SCREEN ACTION

AFTER THE SHOW IS OVER, A WEE DOCHANDHORRIS

apartment level is the maid's apartment, a fine room, with private toilet and shower bath, a set-up which, in itself, should be of no little importance and weight in helping Mary Basil to solve the servant problem. The maid's apartment is independent from the Basil apartment proper, being separated from it by the corridor leading from the projection room to the rear exit stairs. The rear entrance also facilitates service and deliveries to the apartment. Film, however, is not carried over the stairs, such deliveries being made to the projection room level through a film hoist.

One gadget might be mentioned as sure to please the distaff portion of the household—and the male side, too, for that matter! — and it is this: All the closets—and they are ample in number as well as in size—are equipped with door switches which control the closet lights.

Verily, Yehudi has many jobs in that house, beside looking after the light in the refrigerator!

The apartment, as will be noted in the pictures, has been furnished in exquisitely good taste and in keeping with the decorative scheme in which light brown and blue are the dominant colors.

It might be added, as foregone conclusions, that the apartment ties in with the theatre's year-'round air-conditioning system and heating plant, the machinery for which is located outside the main auditorium wall at the stage-end of the structure.

Constantine Basil's design for living, advanced in thought as it is, still provides for the future, and an agricultural —at least, a floricultural—future at that! For the roof over the stores is, in part, laid out with a design for developments to come.

As indicated, the plans of Russell Larke call eventually for the erection of a sunroom, with a greenhouse attached, with an entrance up a couple of steps, from the apartment's entrance foyer. As time went on, a roof garden was installed, a fountain erected, and then — well, maybe the presently unassigned roof space may become a duck and lily pond, or even a swimming pool!

But the future of the Larke-Basil design for living is not restricted to the present fine specimen — it is an idea that might easily reveal possibilities to many a prospective theatre builder.

While this residence-and-theatre construction is probably not well adapted to the larger, early-run theatres in business areas, it does definitely have a place in the thoughts of the man contemplating construction in new developments and for the man with a few theatres, the type of exhibitor who, for the most part, actively manages all his houses.

While figures on the extra cost in this type of construction were not given out, it is obvious that the added cost of creating living quarters such as these is very-very much under what it would have been to build an independent residence of comparable elegance, even without the living room with theatre attached!

THE BROTHERS

A note of real inspiration in the American manner is struck in the theatrical careers of the Basil Brothers, who oper-

THE HEARTH IN THE HOME

THE GROUND LEVEL IS PLANTED

ate the Basil chain of motion-picture theatres in Buffalo and Niagara Falls, New York, and their rise to success forms a typical saga of achievement.

Some twenty years ago, Constantine J., Basil J., Nicholas J., and Theophilos J. Basil determined that they wanted to enter the theatre business. Brother Nick, then head of the business ventures of this fraternal group, reported on the possibility of building the Clinton-Strand, a medium-sized community theatre for Buffalo's' East Side. They built the house.

After that there followed in quick succession the Genesee, Victoria, Jefferson, Broadway, and Roxy — all modern community houses. Later the Varsity in Buffalo was added, followed, in Niagara Falls, by the State, Rainbo, LaSalle, Capitol Theatres.

When the 3,000-seat Lafayette, one of Buffalo's largest down-town theatres, was acquired, the Basils also took over the associated 11-story office building.

Most recent of the Basil theatres are the Apollo, on Buffalo's Jefferson Avenue, a house said to be one of the most modern and ornate theatres of its kind in the country, opening in late 1940, and the Colvin in Kenmore, throwing its doors open on April 9, 1944, with the mayors of Buffalo and Kenmore on hand to felicitate the Brothers Basil.

THE COLVIN

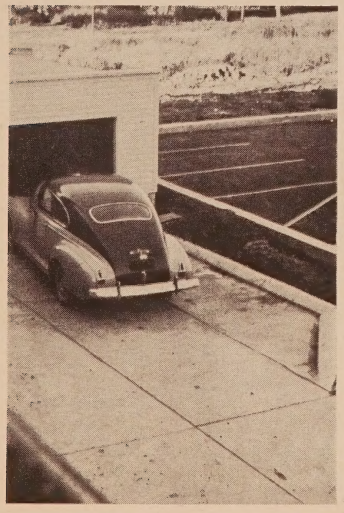
The Colvin Theatre becomes the fourteenth, and latest, cinema of the Basil circuit. Located in a high-class section of Kenmore, itself a suburb of Buffalo, the theatre draws from an area comprising approximately 15,000 people. The house, at its opening, operated third-run, with a top admission price of 35 cents for adults.

Outside

As designed by Russell Larke, the building is built with cinder-block walls, steel-truss roof-framing, and pre-cast concrete slabs. The apartment floor framing is of cast, reinforced concrete, and its roof-framing is of wood joists, with steel girders and wood roof boards.

Front of the theatre portion of the building and the return of the tower are all veneered with Grovenour marble, a gray stone much resembling granite, with the balance of the structure finished in stucco.

A GARAGE WITH PARKING LOT



FOR ABLUTIONS, AND MILADY'S MAKE-READY

RENDEZVOUS IN A PRIVATE ROOF GARDEN

GAMBOL OF THE GENERATIONS

The all-glass entrance doors were made as light in section as possible, and a glass transom is carried to the ceiling. The result is a ticket lobby which is almost open to the street, as far as appearance goes.

A special feature of the Larke-designed lobby is an out-of-the-ordinary utilization of lighting. To heighten the effect of the oneness of the space under the marquee and the ticket lobby, the ornamental lighting at the center of the display marquee is carried down, under, and across the soffit, as a ceiling ornment, and then through the glass "wall" to form the ornamental lighting fixture of the ticket lobby.

The ticket lobby is finished in black-and-gold-marble, with the box-office and display cases generously framed with peach flexglass mirrors. The floor is of tan, black, and rust terrazzo.

Inside

The walls of the circular foyer are trimmed with tufted Fabricoid, and the area has an acoustical plaster ceiling, and a carpeted floor. A circular, suspended lighting fixture the full diameter of the foyer provides the illumination.

HE HAS HIS CLOSETS, TOO

FOR CULINARY EFFICIENCY

Walls of the auditorium have their cinder-block construction overlaid with two inches of rock wool and this is covered with velour. The ceiling is of acoustical plaster. The side-wall decorative fixtures are silhouette figures, slightly moulded.

The so-called crying room, where mothers of small or nursing children may retire in sound-proof privacy, is an especially desirable feature of the newer neighborhood theatres. At the Colvin, this room was given special Sanitas walls, and has fully carpeted floor, with ceiling of acoustical plaster. Instead of the usual type of theatre chair, special, comfortable, and convenient club chairs are provided. A small area just off the crying room—but actually still a part of it—has a hardwood floor where small children, a bit too big to be held in the arms throughout an entire show, may play with a hobby horse and a variety of toys provided by the theatre. A special monitor brings in the sound portion of the theatre's program.

The powder room, like the crying room, up a few steps from the auditorium level, is similar in construction, but having one mirrored wall.

All toilet areas are fully tiled, with tile floors.

The projection room, on the apartment floor, is reached by a special rear entrance and short corridor, with the film being delivered by means of a film hoist built in as part of the building. In equipment, the latest available in sound—together with the modern accessories for efficient booth operation — have been installed.

Parking Area

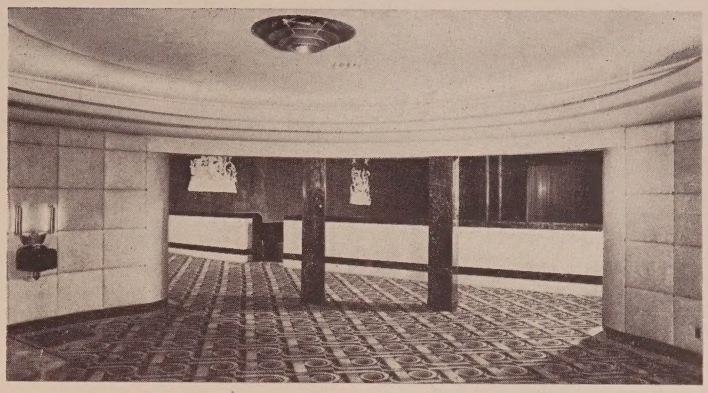
At the time Basil Brothers purchased the lots for the Colvin Theatre, they also arranged to buy the remaining land adjoining in the block for parking area. Due to wartime restrictions, however, it could not be completed until a few weeks ago. But today, that area 250 ft. x 150 ft., large enough for 100 cars, has been completed and is in constant use.

A contract was entered into at a cost of several thousand dollars, which included removing telephone and electric poles, and leveling the ground by bulldozers. The area has a 6-inch foundation of crushed stone of various grades covered by a rough coat, then a finer finish of black top. The entire lot has an abutment of concrete around the outside. This is about 12 inches high and also serves as a bumperstop.

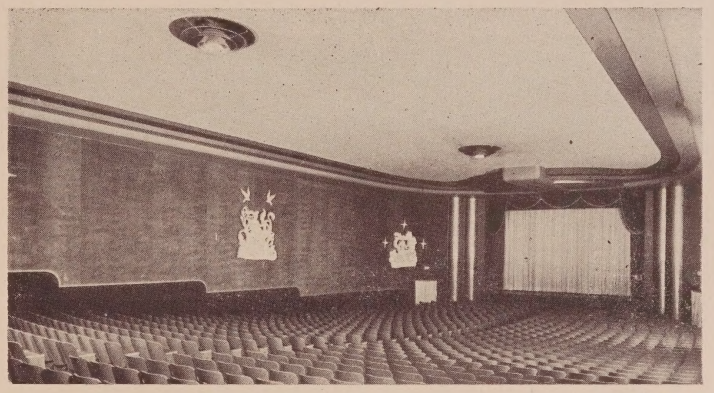
A concrete island has been placed in the center of the lot. This serves as both a walk for the patrons and also a line separator for the cars.

The area has been marked off in order to obtain the maximum in usage and is also complete with directional signs as well as being illuminated.

The village of Kenmore, a suburb of Buffalo, in which the theatre is located is greatly interested in this improvement and at the present time is widening Kenmore Avenue, a cross city thoroughfare in the block where the theatre is located. This naturally results in a better flow of traffic, adds greatly to the appearance of the entire block and prevents the risk of accidents when entering or leaving the parking area.



THE PATRON'S FIRST LOOK-SEE at the Colvin is a vista of simplicity, enhanced by a carpet of bold design. The side walls of the foyer are covered with tufted Fabricoid, with an acoustical plaster ceiling. The pillars of the center are faced with black-and-gold marble, similar to that used around the ticket lobby. The same material is also used to embellish the standee rail. The light-decorated drinking fountain of darker material offers contrast.



THE CASH CUSTOMERS at the Colvin Theatre have this view of the auditorium, and, naturally, it is the general view had from the viewing window of the Basil apartment. The ceiling, with center-lined combination lighting fixtures and air diffusers, is acoustically treated. The walls are covered with velour, with the side-wall fixtures in silhouette and slightly modeled. The theatre, seating more than 1,000, is air-conditioned for year-'round service.

THE PARKING AREA was acquired at the same time the property for the theatre was bought. While this part of the development is not wholly complete, the present area, 250x150 feet, is able to handle some 100 cars. A concrete island has been placed in the center of the lot, to serve both as a walk for patrons and as a line separator for the cars. As is the case with similar parking lots, no charges are levied against theatre patrons.

Brief Consideration of Trans-Lux Theatres

Advantages of the Rear-Projection Cinema Are Listed; Critical Equipment Described

The first Trans-Lux theatre* was opened to the public in the City of New York in March 1931. Since that time the number of theatres has increased, with most attention being centered on the "newsreel theatre" type of operation, so much, indeed, that the terms have become almost synonymous. However, the type of program that can be shown in a Trans-Lux theatre really is not limited. Even though many do specialize in newsreels, short subjects, comedies, and educational pictures, there are not a few that offer their patrons full-length feature pictures. Local conditions alone are the determining factor, and, so far as the theatre is itself concerned, the type of program can be changed at will.

Local conditions also determine what size of Trans-Lux theatre is most economical. Three hundred seats may pay where rent and operating costs are low, while 1,500 seats may be necessary somewhere else. But, whatever the size, Trans-Lux can be used to advantage.

For a typical 500-seat theatre, experience has shown that the building site should have a frontage of 50 feet, a depth of 156 feet, and a ceiling height of 15 feet or more. This size allows for spacing of 39 inches between rows of seats so that the patrons need not rise to permit others to pass.

Two stores, each 15 feet wide by 40 feet deep, may be built on either or both sides of the theatre entrance. The added revenue from the rental of these stores will materially reduce the overhead.

Where air conditioning is required, it is best to have a basement or other space suitable for housing the refrigeration equipment.

The policy of Trans-Lux theatres in relation to its own future theatres is as it has always been. Any location in a transient and cosmopolitan community, with the proper amount of ground space—that is, a minimum of 50 x 120 feet—is suitable.

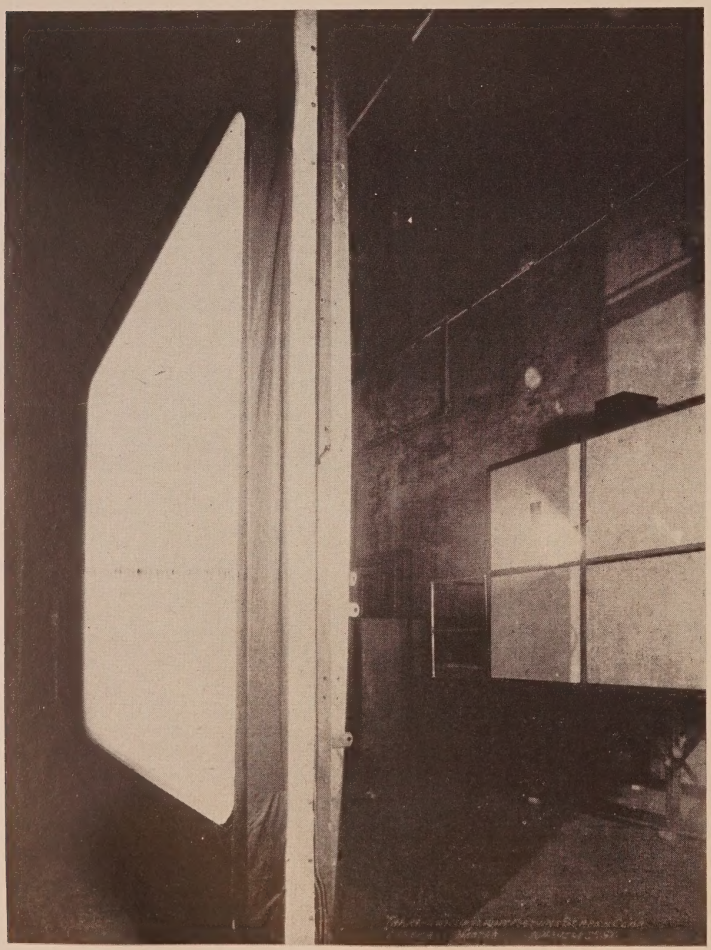
All the company's theatres are all run on the same bases: namely, wide seats, plenty of leg room, well-lighted auditoriums, rear-screen projection, its own patented screen, and the usual typical Trans-Lux courtesy of personal attention.

Although it has been examining and studying a number of new locations, the company policy toward expansion follows conservative lines. Two new theatres, one in Washington and one in New York are under way and there may be more in the near future.

The policy toward outsiders desiring to use Trans-Lux's rear-screen projection and screen has become broader in scope. Up to a few years ago, restrictions were placed on the number of these screens and equipments that were leased to theatre owners other than those connected with Trans-Lux. At present, the company is willing to lease its equipment, provided the lessee meets the qualifications in financial responsibility and the operation of the theatre.

*The material from which this article has been abstracted and condensed, together with the illustrations, was provided by Norman W. Elson, vice-president of Tran-Lux Theatres.

THE TRANS-LUX SCREEN is designed particularly for rear projection. Since the light, unlike in the case of an ordinary screen, must pass through it, this screen is translucent, so that the projected image is focused on the audience side of it. By penetrating the screen, the images are said to acquire a semblance of third dimension. The screen is also said to eliminate distortion, so it matters little what seat the patron occupies for his pleasure.



ADVANTAGES

Trans-Lux, the modern theatre, offers important profit advantages for theatre operation.

Trans-Lux makes the motion-picture theatre a business venture instead of a real-estate speculation. It rents its space, in an ordinary store location, at a store rental. It relieves the motion-picture exhibitor of the risk of owning real estate and it eliminates the heavy burdensome carrying charges of a theatre building.

Trans-Lux makes the opening of a motion-picture theatre simply an installation job. The equipment can be installed on a single floor, with a ceiling height as

low as 14 feet. The cost of a specially constructed theatre building, with a large investment in bricks and mortar, is avoided.

Trans-Lux makes motion-picture theatre a patron self-service operation instead of requiring the usual staff of ushers and attendants. A lighted auditorium, with all seats visible, allows the audience to see and select the seat it prefers. Caretaking duties are extremely slight. Electricity, insurance, interest on the investment depreciation, and other charges are reduced.

Trans-Lux makes the motion-picture theatre a movable business instead of a fixed investment. Since it rents space, its entire equipment can be moved to follow the shifting of a community's center of amusement. Neighborhoods change but a Trans-Lux theatre need not be left behind.

The low cost of a Trans-Lux theatre and its unusual ability to operate in a rented store make it possible for an enterprising owner to start a chain of theatres without expending impractically large sums of money. Expansion is an important factor in any business enterprise, and many consider this one of the most significant features of the Trans-Lux.

In ordinary movie theatres the picture, coming from high up in the balcony, hits the screen at an angle causing keystone and distortion. Viewing the picture from the front row seats and side front row seats is very uncomfortable and the audience usually avoids these seats. With Trans-Lux, on the other hand, the picture comes from directly behind the screen and on a level with it, so that there is neither keystone nor distortion. In a Trans-Lux theatre, many people actually prefer front seats and all seats are good.

With Trans-Lux, safety and convenience are secured with special lighting effects which flood the theatre with a soft, soothing glow which adds greatly to the enjoyment of the picture and makes empty seats clearly visible. No ushers, no tripping over legs in the gloom, and no hunting for lost hats and pocketbooks—but with safety for children—are some of the features that this type of lighting provides.

Watching a brilliantly lighted movie in the ordinary darkened auditorium is claimed to be cause of eyestrain and fatigue. With Trans-Lux, the screen itself eliminates the objectionable rays of light, and, in addition, the auditorium lighting is adjusted to balance the brilliance of the picture, with the result that there is no more eyestrain than there would be in viewing a painting hung on the wall.

In the ordinary theatre, the beam of light coming from the balcony to the screen is plainly visible, especially when smoke and dust fill the air. In viewing the picture, one must of necessity look through the beam, so that its constant flicker may be disturbing and irritating to the eyes. With Trans-Lux, there is no visible beam of light, as the equipment is not in the balcony, but behind the screen. All one sees is the picture itself, framed on the screen without anything to disturb the vision.

Among insurance companies, it is recognized that the hazard of fire in motion-picture theatres is not the fire itself but the resultant panic. With front projection there is great danger from this source. The projection booth is directly over the main exits and the audience knows that it must leave the auditorium in the direction of the fire, so that a panic may easily occur. With Trans-Lux, on the other hand, there is no projection booth in the auditorium at all. Everything is behind the screen: projectors, films, electric wiring, everything that usually starts a fire. The seats are entirely shut off from the projection booth by a fire-proof wall. Should a fire start, the asbestos curtain, with which all Trans-Lux theatres are equipped, is immediately dropped and the audience, seeing nothing, leaves the theatre away from the booth, instead of toward or under it, and there is very little likelihood of panic. Officials of the New York fire department who have witnessed the system have been very enthusiastic about this feature, and, to use their own words, "if every theatre were required to have this system, there would be very little work for us to do in connection with the theatres."

Stringent regulations have been passed in some states with regard to children going unaccompanied to a movie theatre, for two principal reasons: the fear of fire and the panic which ensues, and on account of the sex question. Several of the officials responsible for the passing of these state laws state that if rear projections were installed in the theatres, they would be prepared to recommend important modification permitting children to go alone.

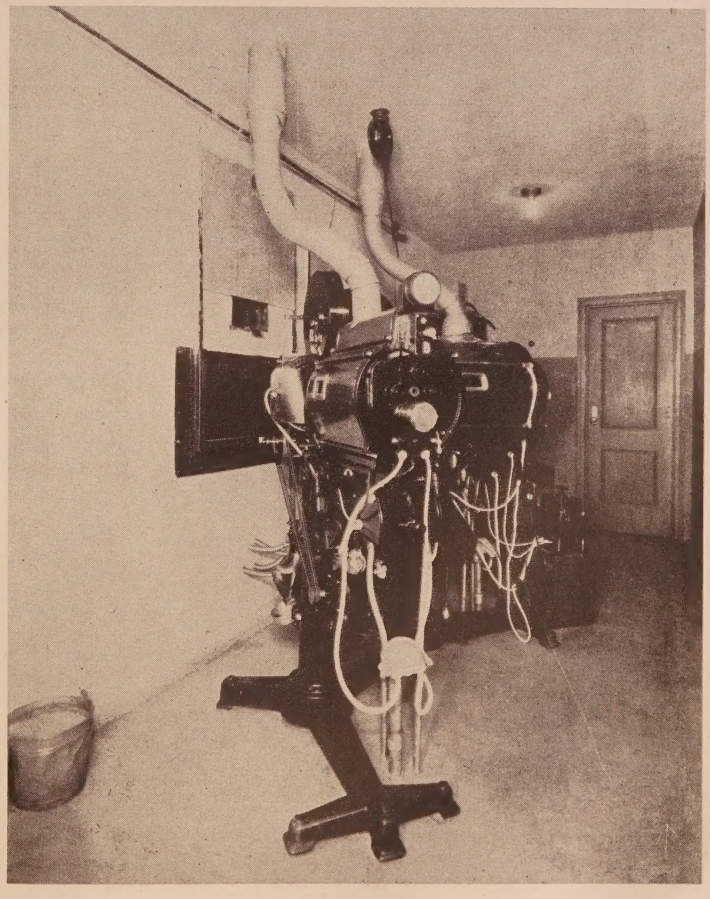
THE TRANS-LUX SYSTEM

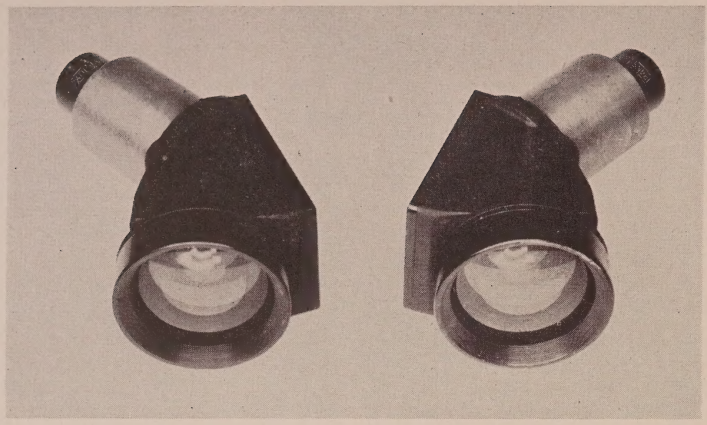
The Trans-Lux rear-projection system for showing talking motion pictures in the theatre, auditorium, and home, is the result of years of research work, and the coordinated development of two distinct features—the screen and the lens.

The Rear Projection Screen

The Trans-Lux rear-projection screen is different from the ordinary motion-

TRANS-LUX PROJECTION, so far as the projector equipment is concerned, is no different from that in ordinary theatres. By the use of the Trans-Lux lens system, however, a different handling of projectors is necessary, the machines being placed at right angles to each other, at a position that the lenses are aimed at the center of the screen. In this way, some footage in the depth of projection room can be saved. Lamps are of the usual type.





THE TRANS-LUX WIDE-ANGLE LENS is what makes this type of rear projection possible. Designed to give a 1:1 ratio in screen width to lens distance from the screen, the lens also contains a special optical system so that a mirror image is projected on the screen, but, of course, seen correctly by the audience out front. In this manner, no special projection equipment is needed, the machines being operated entirely in quite the orthodox manner.

picture screen—it is transluscent instead of opaque, and is especially designed for rear projection. The picture coming from behind the Trans-Lux screen penetrates through to the front surface and appears there sharply defined and with an illusion of depth. This means that no matter where you are sitting in the theatre, the picture is without distortion or fadeway, so that front seats and boxes are all good seats.

The Trans-Lux screen is made in standard sizes, up to 18 feet wide, entirely in one piece without seams. It is stretched tightly on a frame and remains tight in all kinds of weather. It is shipped to the theatre rolled and is mounted at the job on a permanent frame installed in the theatre.

Owing to the clear definition and depth of the picture, the 12 x 15 foot screen is said to be large enough for a theatre with a seating capacity of about 2,000 persons.

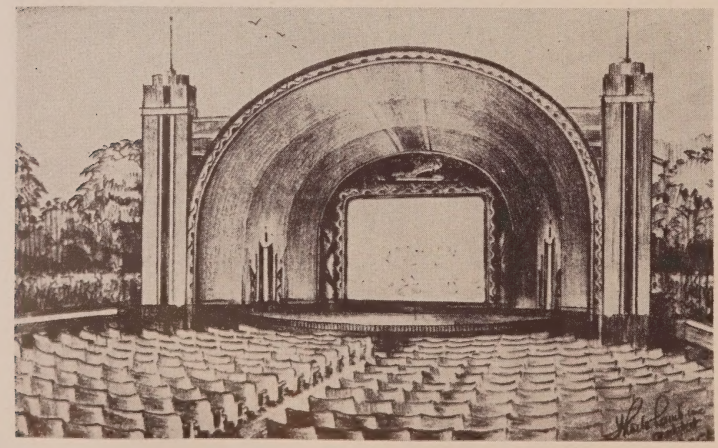
If the stage is equipped for vaudeville performances, the screen can be swung into the fly loft and replaced without any loss of time.

With this daylight screen, the theatre can be lighted to any degree the individual manager may decide his patrons like best. The most effective amount of light is that which permits the patron to read a program and does away with the necessity of the ushers carrying flashlights.

Color movies are particularly brilliant on the Trans-Lux screen, giving the impression of a beautiful painting rather than a projected picture.

The first Trans-Lux rear-projection screen was perfected just in time to be installed at the Roxy Theatre in New York for the opening night, March 11, 1927. This screen was 18 x 22 feet.

THE TRANS-LUX SYSTEM is adapted to a wide variety of locations, with outdoor theatres being a natural. In this sketch is seen one such idea. In such shells, there is usually sufficient space to install a Trans-Lux projection room, and, if not, such space can be conveniently added. Thus the project becomes broadened in amusement scope, to include motion pictures, no less than stage spectacles, operas, symphony orchestras, and even large civic affairs.



The Wide-Angle Lens

To obtain a lens which gave perfect definition and passed sufficient light required years of study, and it was only during the latter part of 1929 that the scientific difficulties were finally overcome.

The Trans-Lux wide-angle lens makes possible the projection of a picture from behind the screen. It also makes a picture possible with only one foot behind the screen for every foot of width of picture. That is, a 15-foot picture requires only 15 feet from lens to the screen. Using an ordinary projection lens, about three and a half times this distance would be required, or about 53 feet, which, of course, would be impracticable on an ordinary stage.

Furthermore, the Trans-Lux contains a special prism which reverses the picture without having to reverse the film—standard projectors and sound heads can be used—the regular film from the exchanges is threaded through the projectors in the usual way.

The two projectors are placed so that the lenses are only 12 inches apart and on a level with the center of the screen. This arrangement eliminates keystone and distortion of the picture which is present in front projection where the booth is in the balcony.

Projection Room

Except for the special placing of the projectors and the lenses, the booth is entirely standard as to equipment and operation.

The projectors are placed at an angle of 90 degrees to each other so that they require less depth of booth than is ordinarily the case.

This arrangement provides ample room for the efficient operation of the machines in addition to the saving of space.

FUTURE ANGLES

There are many locations where it is practical and expedient to build a Trans-Lux theatre entirely in the open air, at low cost for construction, at considerable saving in operating expense. This is particularly so where a grove of trees or a roof offers some measure of protection from the direct rays of the sun.

In gardens, where refreshments are served, a Trans-Lux theatre may prove to be an attraction which will greatly increase profits.

In warm climates, where the cost of cooling an ordinary theatre has been a problem, Trans-Lux makes possible an outdoor theatre at a minimum cost.

As for television, the Trans-Lux screen and equipment is adaptable to this type of picture. The company is in a position to turn out as much of this equipment as is necessary, and is looking forward to serving this new industry.

There is, indeed, a large field for the Trans-Lux rear-projection system, not only for motion-picture theatres, but also in many and varied branches of the motion picture industry, the fourth largest industry in the world. With rear-projection, the public is offered better and softer motion pictures, as well as greater comfort, ease, and safety in the enjoyment of this most universal form of modern recreation.

Drive-In Theatres and Their Construction

Pros and Cons of the Outdoor Auto Theatre Summarizing Principles of Their Planning

By W. W. Smith
President, Park-In Theatres, Inc.

The drive-in theatre is now recognized by both independent and large circuit-operators as an extremely lucrative business.

The first known installation of a drive-in theatre was started in 1933, just outside the city of Camden, by Park-In Theatres, Inc., Camden, New Jersey. By 1940, over one hundred of these theatres were in operation throughout the United States.

Contrary to what was expected when the drive-in theatres first opened, attendance at the nearby enclosed theatres was not adversely affected, because the drive-in audience was made up largely of a clientele which had not been in the habit of attending the motion-picture theatre in the past. This clientele included mothers with small children (about 80 percent); laborers and factory workers who, coming from a hard day's work in old clothes, did not want to go to the bother of dressing but wanted to relax in the open air; stout people who found the average theatre chairs uncomfortable; elderly people; people in ill health; cripples and other shut-ins. It was found that the drive-in theatre also appealed to many of the young people who had not been in the habit of going to the movies in the past, but who found in the drive-in theatre a picnic-like atmosphere; a chance for an automobile ride, and then an opportunity to see a moving picture in the open air while nibbling a hot dog and drinking soda pop.

Progressive theatre circuits and independent owners, realizing the popularity of this type of theatre, as well as the tremendous profit it offered, built approximately fifty drive-ins during 1940 and 1941. In 1942, plans were made for the construction of approximately fifty more, but most had to be shelved because of War Production Board restrictions on building materials, and motion-picture sound and projection equipment.

Most drive-in theatres include concession stands which offer for sale, candy, soft drinks, hot dogs, popcorn, ice cream, tobacco, and the like.

The refreshment stand has been found to be a very profitable operation in the drive-in theatre, the gross revenue being reported to be as high as 40 percent of the gross revenue from the sale of admission tickets. Another very profitable service is a gasoline filling station, with entrances from the highway and from the exit of the theatre. Many other extra services are being made in the planning of post-war drive-in theatres.

The great interest being shown in the drive-in theatre will result in considerable activity in this type of construction when building materials and equipment are again available. Many Governmental agencies and equipment manufacturers predict that more than two hundred more drive-in theatres will be constructed when the green light finally comes on.

In the years ahead, automobiles will be more numerous than ever and many additional thousands of people will be able to drive to the open-air theatre. Improvements in operating technique, together with better projection and sound equipment, will make the drive-in theatre a source of more entertainment than ever before.

PROS AND CONS

The drive-in theatre offers many advantages over indoor theatres, and it also has a number of disadvantages. The most important advantage to the owner is the lesser property, construction, and equipment cost of the drive-in theatre over the indoor theatres. While the drive-in theatre requires considerably more ground space than an indoor theatre, the square-foot cost of the ground is generally lower, because the drive-in theatre is best located on the edge of a city, while, of course, the indoor theatre, to be a profitable venture, must be located in a built-up neighborhood where property values are markedly higher. Even so, the initial ground cost of a large drive-in theatre should not be any more than that for a down-town theatre of equal capacity.

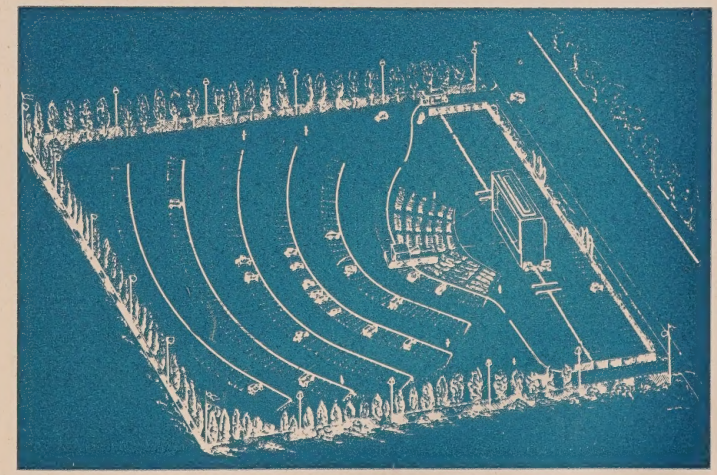
Operational costs of the drive-in theatres are materially less, as are the real estate taxes, building depreciation, and maintenance, cleaning, renovating, and general operation can be handled with fewer employees. With the exception of the extra usher service and maintenance required by sound equipment, the cost of operating the balance of the equipment is less because of the comparatively few hours of daily operation. The fact that there are no seats, carpeting, drapes, and other indoor theatre acoutrements to wear out in the drive-in theatre means the saving of an important operational cost.

Projection, on the average, is quite as good in the drive-in as in the urban theatre. The advantage of projection on the large screen (generally 30 x 40 feet in size) used in the drive-in is, however, sometimes lost by generally poorer definition.

Sound in the drive-in is often superior, especially when advanced-model in-car speakers are used, to that of many indoor theatres. When a central loudspeaker system is employed, synchronization of sound and picture may not be up to that in the urban theatre, because of the long distance between screen and the majority of the audience.

These disadvantages are important to consider, but as admission charges for the drive-in theatre are about the same as those of the average urban theatre, and the customer capacity of the drive-in is far greater than the average indoor house, the annual gross receipts of the

THE DRIVE-IN THEATRE, from the drawing of the original patent, issued to Richard M. Hollingshead, Jr., was an unpretentious development, as is shown here, being comprised of little more than a parking lot on which a projection house and screen tower were installed. While some present-day architects still use the idea, it is interesting to note that the original plan called for a limited area for seating at the screen end of the "auditorium."



average drive-in, even with its short daily and seasonal operation should equal the annual gross receipts for a moderate-sized theatre with its longer daily and seasonal operation.

In some drive-in theatres the admission is actually higher than in competing houses, mainly because of the fact that people like to drive out in an evening and would not, anyway, go to the regular theatre.

While there is as much variation in actual tariffs at drive-in theatres, as there is with the regular cinemas, the tickets generally sell between 30 and 60 cents, with an average approximating 40 cents.

Except in the few states that enjoy warm winters, the drive-in theatre has a relatively short season, which, of course, restricts the theatre's earning power correspondingly. Picture presentation can only be effected at night, so that the number of daily shows are limited.

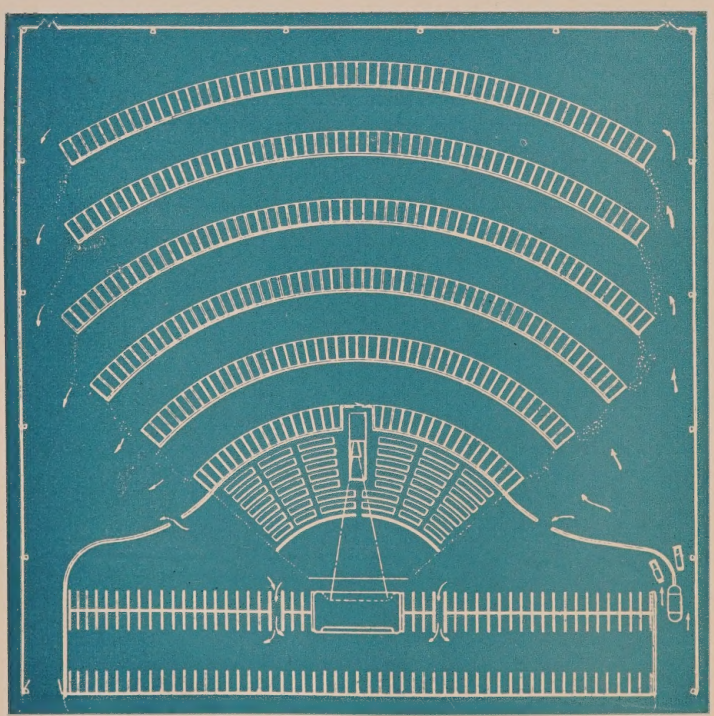
Regular picture presentation is also subject to weather conditions. Heavy rains and extreme high winds keep down patronage much more than they would in regular moving-picture houses.

Obviously, too, its geographical location is important, since, if the drive-in's operating season is exceptionally short, its chances of financial success are limited. The length of the operating season depends upon the geographical location and climatic conditions. In many of the southern states, such as California, Florida, and parts of Texas, drive-in theatres may be operated from ten to twelve months of the year.

Drive-in theatres located in states north of the Mason-Dixon Line, however, have been pronounced financial successes. Northern states having drive-ins include Connecticut, Illinois, Indiana, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Washington, and Wisconsin. Although the length of the operating season in the northern states is limited by cold weather, it has been found that the northern theatres do a very intensive business during their operating season. The reason for this is that the people in the north are cooped up all winter, and during the warm months of the year they are extremely interested in any kind of sport or entertainment which is out in the open air.

Another aspect of drive-in operation is that of using it as a summer adjunct to a small wintertime house, under that particular condition where normal winter business can support a small house but so far as the house itself is concerned, the summer cannot. Then the drive-in, with its power to draw from a much greater radial distance, comes into its own. Indeed, one theatreman has gone so far as to shift his first-runs to his drive-in and to close down the regular house, thus doing not only more business, but saving an air-conditioning installation on his enclosed theatre!

THE ORIGINAL "FLOOR PLAN" better shows the area set aside as a sitting space, and shows also additional space, space provided for parking cars within the theatre's acreage. The arrows on the diagram, after the original patent, indicate the flow of traffic over various parts of the theatre. While modern architects have improved on the actual lay-out, and added other attractions to the theatre, the basic Hollingshead idea is still good.



THE DRIVE-IN THEATRE SITE

The amount of land required depends on a number of factors, including (1) car capacity desired, which governs the number of ramps needed, (2) size and location of screen tower, and (3) proximity of the entrance to the highway.

Some idea of the acreage required may be gained by the fact that a theatre of three to four hundred cars can be built on five to six acres, while one with five to six hundred cars would require eight to ten acres.

Location of a Drive-In Theatre

In the design of a drive-in theatre, the selection of the site is of utmost importance, as success or failure of the project hinges upon the theatre being properly located.

Accessibility to well-traveled highways must be placed at the head of the list for the same reason that indoor theatres are located where the traffic is heaviest. It has been found from experience that the best type of highway on which to construct a drive-in theatre is what is usually termed the "floating" or local highway as contrasted to the "express" or through traffic road. This type of highway is usually dotted with refreshment stands, night spots, and other local activity which influence patronage.

If the terrain of the site is level, much will be saved from the rather expensive grading cost. If the lot is much lower than the adjoining highways, its poor drainage must be corrected by fill-ins which could be costly.

Unless a suitable drainage system is provided, the parking area may become a mire during heavy rains, making it difficult to handle the movement of cars. If the site is sufficiently close to city water and sewer systems, the cost of sinking wells and constructing cesspools can be entirely eliminated. It is far better to pay a little more for a properly located, level, well-drained tract of land than one lacking one or more of these important qualifications.

If they are not available, a well would have to be drilled to supply water and a cesspool or other type of septic tank for sewage disposal.

There are certain costs of improving the land itself which would not appear in the costs of construction of an indoor theatre. The most important of these costs are the construction of earthen ramps, grading, driveway construction, drainage, landscaping, and fencing. Obviously, rocky, uneven ground would add materially to the expense of the ramp construction. In fact, such terrain could conceivably cause expense which would make the project an unprofitable venture. Careful consideration of these costs should be made before purchase of the site is effected.

And, of course, there is another charge which should not be forgotten. That is the royalty on ramp construction, held under the terms of United States Patent 1,909,537, issued May 16, 1933, to Richard M. Hollingshead, Jr., of Riverton, New Jersey. As a result of the subsequent assignment, the Park-In Theatres, Inc., grants licenses on the basis of $1,000 down for an exclusive territory, plus a royalty of 5 percent of the box-office receipts after deduction of admission taxes. For the fee, the prospective

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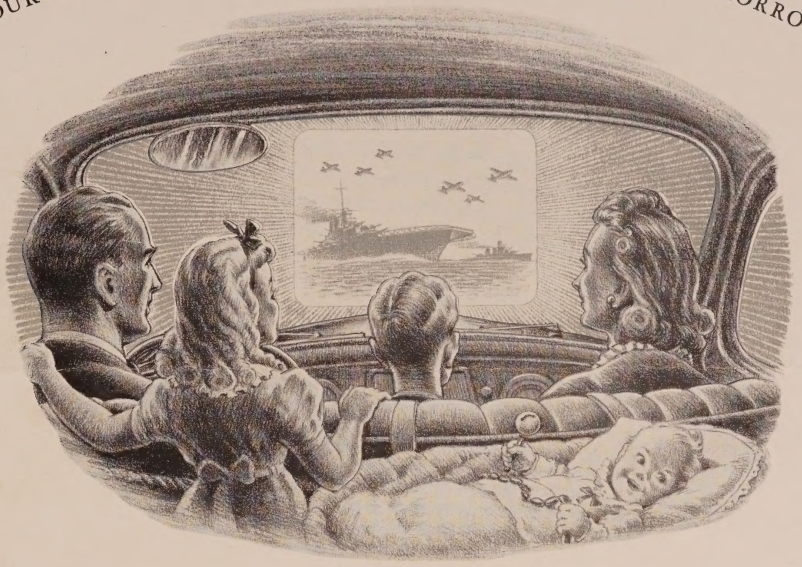
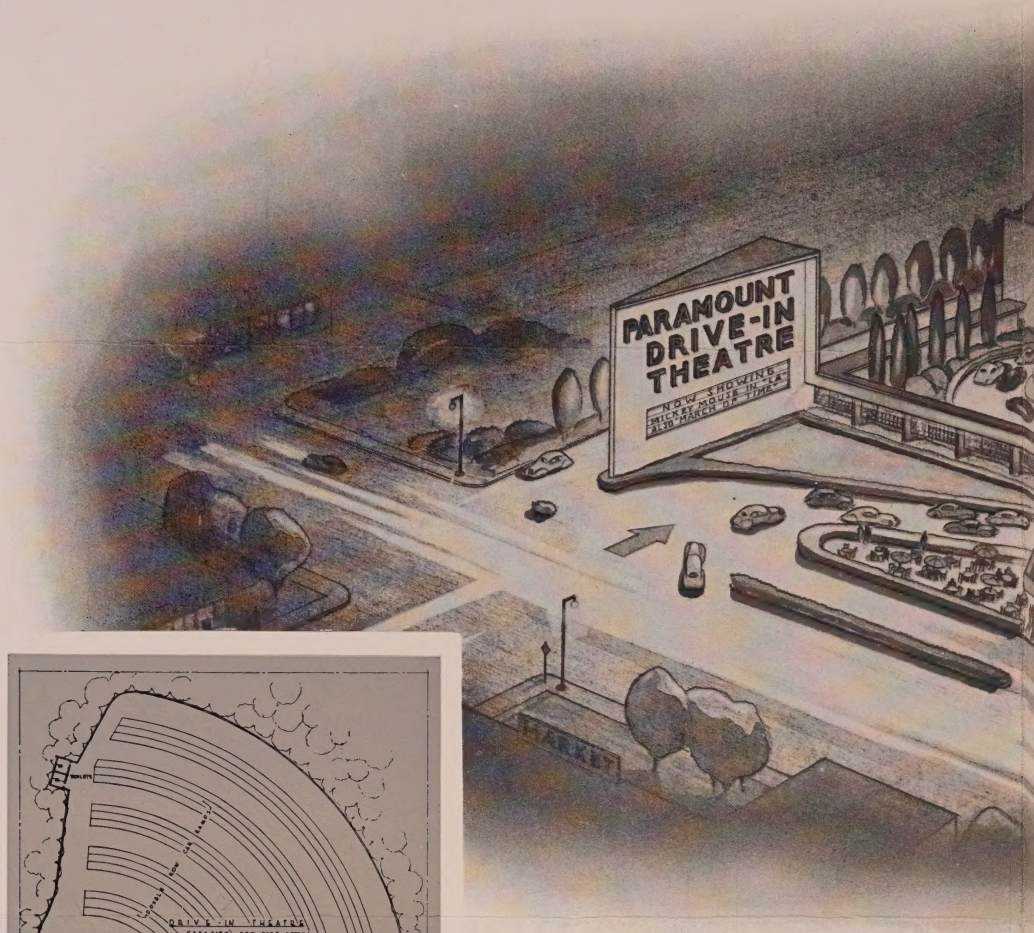
YOUR MOTION PICTURE THEATRE OPPORTUNITY OF TOMORROW

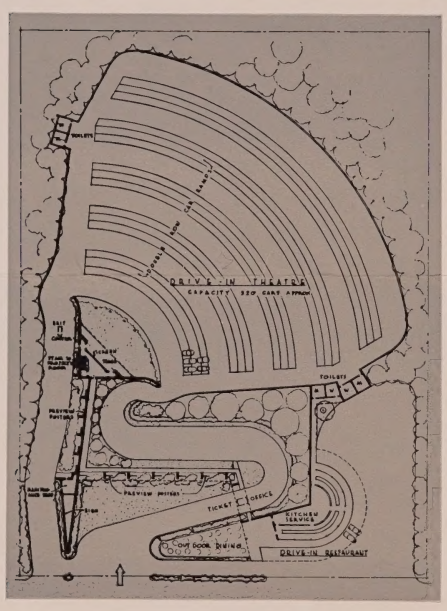


The "Drive-In" Theatre

OF INTEREST TO EXHIBITORS IN THE MOTION PICTURE BUSINESS

the motion picture theatr





★ Individual High Fidelity sound equipment and self-controlled speakers in each car guarantee perfect acoustics.

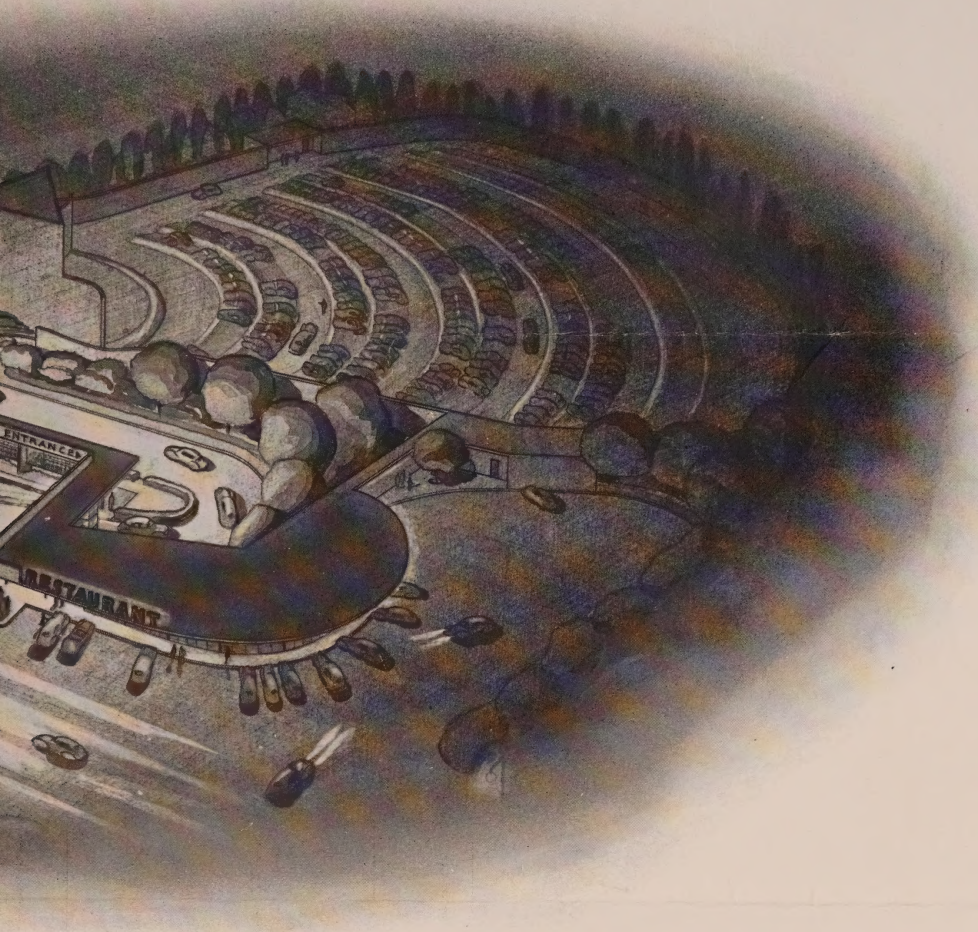
★ Parking is no problem, no expense — it is a distinctive, pleasant part of the DRIVE-IN.

★ Your car and its contents are safe, it being in your possession at all times.

★ No seats are as comfortable as the automobile's seats . . . they are equivalent to an easy chair, to stretch out or lounge in in comfort.

★ You may smoke at will with no annoyance to your neighbor.

e of tomorrow . . . *today*



★ Refreshments, candy, ice cream may be served to the cars.

★ You and your family are safe from fire and earthquake hazard.

★ It is not necessary to split your theatre party.

★ The whole family attends the movie at ease.

★ You are not disturbed by late arrivals and you disturb no one when you leave.

★ If you wait in line, you remain seated in comfort in your car.

★ At times of epidemics of colds the children in your party are not exposed to crowds.

★ Any type of dress is correct at the Drive-In, the privacy of your car makes this possible.

★ Rain does not effect the vision or sound.

★ Operation of the Drive-In is not subject to labor troubles as the only skilled employee, outside of management, is the projectionist.

★ Offers unlimited expansion possibilities for community center development. The Drive-In Theatre can be the central point around which is built the shops, restaurants, markets and other professional buildings that make up the successful modern shopping center.

a profit-making idea!

1. *Advantageous locations* . . . "Drive-In Theatres" are particularly well-suited for vacant areas in the path of growing communities.

2. *Land Investment Potential* . . . Original purchase of well-located land at minimum prices assures an increase in value, as the community grows up around "The Drive-In Theatre" property.

3. *Comparative cost of construction* . . . A 600-car capacity "Drive-In Theatre" will seat 2400 people at an approximate cost of $50,000. A required Class "A" constructed theatre with this capacity would cost in excess of $500,000 for the building alone. Taxes, insurance, and original property costs would be prohibitive.

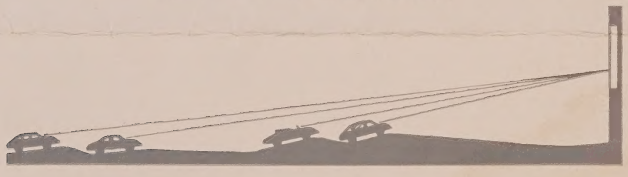
4. *Maintenance and cost of operation* . . . No heating or ventilation systems are required. No repairs or wearing out of seats, carpets, or draperies. Stage equipment is at a minimum. Insurance is nominal.

5. *Non-competitive to other types of theatres* . . . Drive-In Theatres develop their own types of patrons. The racial problem is easily solved because there is no close contact between cars. The ease of attendance is especially attractive to those who do not want to take the trouble to dress up, park their cars in crowded busy areas. It is especially designed for patrons who have incapacitated invalids, oldsters, or children. They are more comfortable in the family car. Film Service is easily obtainable as second, third and fourth run showings get added patronage because of these many advantages, thus giving the picture producing companies additional revenue.

6. *Post-war construction outlook* . . . Peacetime will undoubtedly bring a building boom with all of its attendant delays and higher costs. The Drive-In Theatre offers a minimum of problems in the construction field. Few critical materials are used. The large majority of equipment is pre-fabricated and installation will offer no problems with the release of labor from the armed services.
   Exhibitors everywhere are invited to investigate the post-war profit possibilities of "The Drive-In Theatre."

7. *Franchise* . . . Exclusive License in your community is granted under patent 2,102,718, issued December 1937 by the U. S. Patent Office.

NOW IS THE TIME TO ACT



Write or wire for further details about
an exclusive franchise in your district.

WILSON COMPANY

FRANCHISE HOLDERS UNDER THE JOSSERAND DRIVE-IN THEATRE PATENTS No. 2,102,718

SUITE 549 PETROLEUM SECURITIES BUILDING

714 WEST OLYMPIC • LOS ANGELES 14, CALIFORNIA

theatre owner is furnished complete data, plans, and other details on grading ramps, locating and constructing the screen tower and projection house, and other items germane to the patent.

The actual building construction of a drive-in theatre is limited to projection building, offices, concession stands, screen tower, and washrooms. Often the construction of such building can be limited to but two structures.

Equipment costs of a drive-in theatre are generally less, as chairs, carpeting, drapes, furniture, air-conditioning systems, and the like, are obviously unnecessary in the drive-in theatre.

The projectors, generators or rectifiers, lenses, and booth accessories cost the same, but arc lamps used in the drive-in theatre sometimes cost more. Drive-in sound equipment will cost double or treble, and the cost of installation is very much higher especially if individual car speakers, post, or the out-of-date speakers are used, because of extensive wiring requirements.

When individual type speakers are used, the drive-in theatre may be located closer to cities and towns. It has been found in many cases that theatres so equiped can be within one quarter mile of heavily populated residential districts, without danger of the sound system disturbing the inhabitants.

CONSTRUCTING THE THEATRE

In the construction of the drive-in theatre, the main things to be considered are (1) the method to use in laying out the parking area, (2) the construction of the screen tower, and (3) the construction of the projection booth.

Type and Number of Ramps

As no drive-in theatre could be successful unless the occupants of each car have an unobstructed view of the entire area of the screen over the tops of the cars ahead, proper ramp construction is of prime importance.

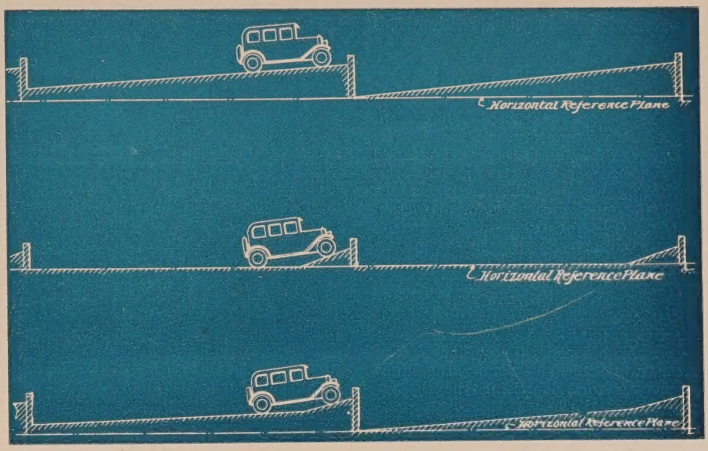
The type and number of ramps, determined by the architect after the size of the site has been decided, will depend upon the radius of the ramps and the amount of land available. Obviously, the total capacity of automobiles that the theatre will accommodate depends on the size and number of ramps.

The theatre area should be laid out so that the screen faces a generally north or easterly direction, to eliminate the loss of operating time occasioned by lengthy twilights. If possible, the screen building should be located at least 120-150 feet from the highway and the screen itself be placed so that it is not visible from outside the theatre area.

The theatre area, is usually graded into a series of semi-circular ramps sloped upward toward the screen so that the front ends of the cars are elevated permitting all occupants to view the picture while sitting back in comfort.

Grading Parking Area and Ramps

Before grading the parking area, it is necessary to provide an adequate drainage system so that during long periods of rainy weather, the parking area will not become flooded or muddy. Competant engineers should be consulted to determine the type of drainage system best suited for the proposed location.



THE RAMPS OF THE DRIVE-IN THEATRE is, perhaps, the main idea covered by the patent. Here are the inventor's drawings of three types of ramps. At the top, a continuous, even incline; in the middle, a short, abrupt ramp which raises the front wheels of the parked car; and, at the bottom, a combination of the two ideas. In these three ideas are embodied all the variations on the theme that might be employed in use of Hollingshead patent.

The parking area must be graded and formed so that the occupants of each car will have an unobstructed view over the top of the cars parked directly ahead. This is accomplished by the construction of a series of semi-circular ramps, with the focal point at the center of the screen.

Two different types of ramps—commonly known as the "drive-over" type and the "bulkhead" type—have been used with good success, but the drive-over ramp has been found the most practical. This ramp is designed so that a car may be driven up on the ramp until the front wheels of the car are located at the highest point of the ramp. With the car in this position, all of the occupants have an unobstructed view of the entire area of the screen. When leaving the ramp, the car drives straight ahead and over the ramp to the exit. Some of the other advantages of the drive-over ramp are (1) less expensive because abutment construction is not required, (2) less space is required between ramps, and (3) faster and more even traffic flow from the parking area.

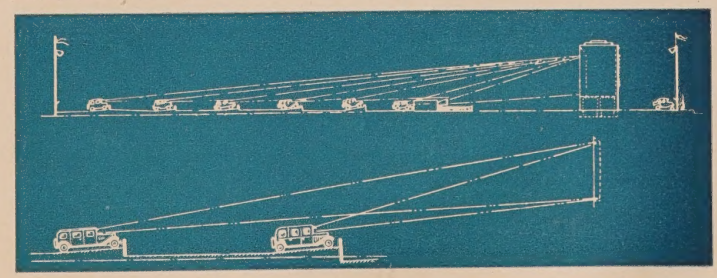
After the parking area has been graded and formed into ramps, the entire surface should be coated with macadam or similar material. A method, which has been used with good results at several theatres, is to have a hot penetrating oil poured over the ground followed by a layer of No. 6 decomposed gravel, which is rolled into the surface and then soaked with a heavy gravity road-oil. The entire surface is then covered with a layer of fine crushed rock and rolled with a four-ton roller into a hard compressed surface.

The use of flood lights around the periphery of the parking area has been found to be beneficial in reducing the amount of time required between shows for the entrance and exit of cars.

The lights are turned on immediately at the end of the show and they are left on until the movement of cars has been reduced sufficiently for the start of the second show. Care should be used when placing these lamps to make sure that they will not glare into the eyes of the drivers as they enter or leave the theatre.

One of the unusual features of a recent design is the parking bays which make it possible for patrons to park inside the theatre while awaiting a vacancy. This eliminates loss of patronage, often resulting from the theatre goers' turning away when they find the approaches to the theatre crowded with cars, and

SIGHT LINES are, naturally, most important in a drive-in theatre, where the patron must be able not only to see over the heads of those in the front seat of the car he is in, but he must be able to see over the car ahead. In these sketches, from the original patent, are seen how the ramps so raise the front of the car that all occupants of all cars are able to see all of the screen. The lower drawing shows the sight lines for two cars in greater detail.



should have the beneficial effect of increasing attendance.

THE SCREEN TOWER

When the site of the drive-in theatre has been selected, the second important step is the location of the screen tower.

Among the points to be considered are (1) the position of the land in relation to highways to allow easy entrance and exit and good display for attraction boards; (2) the location of nearby homes; and (3) the necessity of facing the screen north or northeast away from the setting sun so that the show can start as early in the evening as possible.

The screen building is really a dual-purpose building—its side which faces the patrons serves as the motion picture screen, while the side facing the highway serves for advertising the theatre and its attractions.

In addition to housing the screen, it offers the exhibitor an excellent opportunity to exercise real imagination and showmanship which favorably affect box office grosses.

In the past the screen tower has seldom been designed to secure the eye-catching and advertising benefits to which it naturally lends itself. Some idea of the streamlined beauty and ingenious displaymanship with which the architect will clothe the drive-in theatre of tomorrow may be gained by the illustrations in the section on Design in this volume.

This is no dream-theatre, but a practical design in which all the elements blend into an inviting showplace which, by its physical appearance alone, builds patronage and gives the exhibitor a better than even chance of success.

Park-In Theatres, Inc., has now developed, for the use of its licensees, plans and specifications for a pre-fabricated screen structure which will be attractive in appearance and economical in construction as compared with other types of screen towers. The plans call for a screen tower accommodating a 30 x 40-foot picture. Plans for even larger-size screens are under way.

The screen building sometimes houses the theatre offices, box office, concession stands, and wash rooms, and, if a central speaker system is employed, it serves as a support for the loudspeaker equipment.

As the size screen most in vogue is 30 x 40 feet, obviously the screen building must be large in size and it must be strongly constructed to withstand all wind and weather conditions.

The screen building must be designed so that good sight lines exist between the screen and each car ramp.

The screen itself is best made of a smooth-grain plaster or plywood, painted with flat white, rain- and weather-resisting paint.

Construction of the Screen Tower

In planning the construction of the screen tower, careful consideration should be given to its location, the size screen required, and the space which will be needed for offices, employees' locker and dressing rooms, storage, and rest rooms.

The location of the screen tower is generally deterined by considerations such as the lay of the land with regard to the highways and the location of nearby homes, but for optimum results, the screen should face in a general direction away from the setting sun, so as to obtain as much advantage as possible in advance starting time.

A shadow-box has proved helpful in many cases by preventing extraneous light from shining on the screen. In general, however, a shadow-box has little effect in shielding from the screen the moonlight, or the reflected sunlight which is present just before complete darkness sets in.

The location and construction of the screen tower must be such as to allow easy entrance from the highway, along one side of the screen tower to the parking area, and easy exit from the theatre, along the opposite side of the screen tower, to the highway.

Screen towers can be of a structural steel frame covered with magnesium or aluminum sheets. In one case, the front facing the highway was designed as an actual water-fall, illuminated from behind with colored light, producing an inviting effect which can hardly be ignored by passing motorists.

A service loop should be construced at the entrance to the theatre so that it will not be necessary for drivers to park cars on the highway while the occupants of the cars ahead purchase admission tickets, or when the theatre is filled to capacity, to wait until parking space is available in the theatres.

The most desirable location for the manager's office is at the end of the screen tower, adjacent to the main entrance. In this location, the manager is in close proximity to the box office where he can extend close supervision over his employes in the handling of cars during rush periods. This location also affords much better protection of the box-office receipts than if the manager's office were at some distant location.

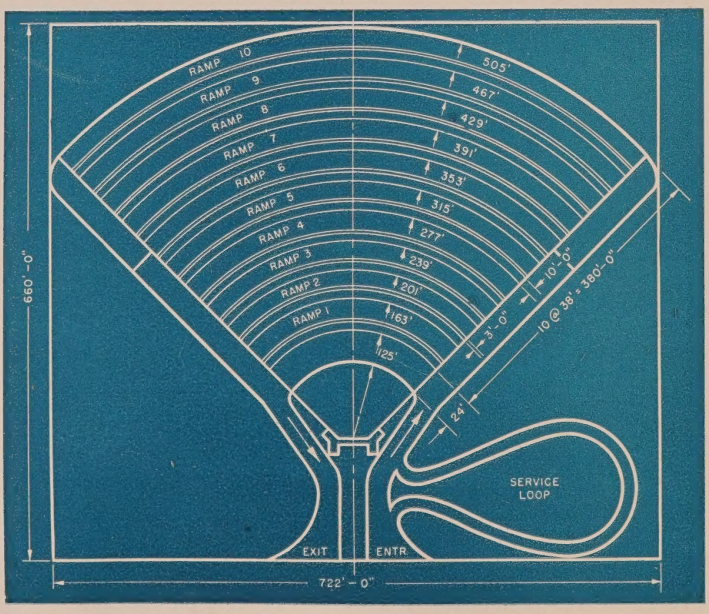
The box office and entrance and exit turnstiles can be of porcelain enamel on metal.

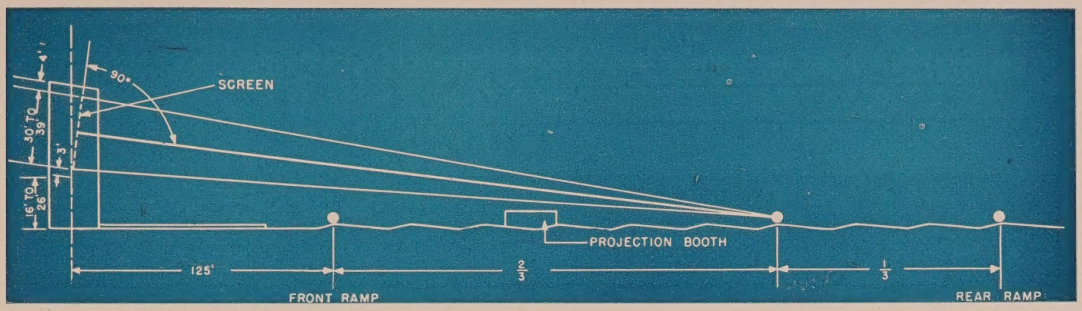
Storage space should be provided in the base of the screen tower so that all maintenance tools, in-car speakers, and machinery may be stored during the winter months when the theatre is not being operated. This storage space should be constructed with a good, solid floor, high enough above the ground level to eliminate any danger of water flooding it.

The size of the screen must be determined from the total amount of light available from the projection equipment, and from the distance between the screen and the last row of parking ramps. Although no set rule has been established for determining the width of the drive-in theatre screen, it has been found that satisfactory results will be obtained if the width of the screen is equal to one-tenth the distance from the screen to the last ramp. The minimum recommended screen width is 40 feet, and the maximum recommended is 52 feet. The screen must be high enough above the ground level so that the cars parked on the ramps directly in front of the projection booth will not be in the line of projection. Usually this distance is a minimum of 16 feet and a maximum of 26 feet.

The screen may be constructed of smooth-grain plaster or large, flat panels. Plywood and flat Transit boards (manufactured by Johns-Manville have been found satisfactory. The joints and seams between panels should be sealed so that they are not noticeable. The entire area of the screen should then be covered with an outside flat-white paint. Some

THE DRIVE-IN THEATRE OF TODAY shows many refinements over the theatres postulated in the original patent. Two major developments are the precision widths of the several tiers of parking stalls and the installation of a service loop, serving not only for convenience in making deliveries to the theatre, but also for a "standing room only" area when there are no empty stalls. The ten ramps hold 535 cars. (Park-In Theatres, Inc., diagram.)





DRIVE-IN THEATRE SCREEN ARRANGEMENT. For the maximum reflection of light to the parking area and for the minimum keystone effect, the screen of a drive-in theatre should be tipped from the top forward, so that it will be perpendicular to a line drawn from the center of the screen to a point located approximately two-thirds of the length of the parking area from the screen tower. In this drawing used through the courtesy of the Radio Corporation of America, are given some of the measurements. The precise measurements and dimensions, of course, can be determined only from the actual theatre, and the figures are just for illustration.

drive-in theatres have reported that they obtained especially good results using a flat-white concrete paint. Under no conditions should a glossy white paint be used, because of the shining and unreal appearance it will impart to characters' faces and other light-colored objects in the screen images. Silver and aluminum paints are not recommended because of the difficulty in applying this paint evenly over the entire area of the screen and because they discolor rapidly. These defects become very noticeable especially when the picture highlights are viewed, such as sky backgrounds.

For maximum reflection of light to the parking area, and for the minimum "keystone effect," the screen should be tipped slightly so that it will be perpendicular to a line drawn from the center of the screen to a point located approximately two-thirds the length of the parking area from the screen tower.

Other Details

Individual loudspeakers are stored and distributed at the entrance and collected at the exit canopy. The new RCA speakers are left out in the open as they are weather-proof.

The lighting and traffic control may be handled by indirect lighting which illuminates the ground areas and may be controlled from a switchboard in the manager's office.

The refreshment stand concessions are usually located in the projection building, thus providing a central location.

The approaches to the theatre, when well landscaped, add materially to its effectiveness and should be included in the architectural design.

It is apparent that in every detail of construction the drive-in theatre of tomorrow, even though planned on a modest scale, will reflect the degree of careful planning which has made the indoor theatre the amusement center of the community.

PROJECTION BOOTH BUILDING

The projection room building is usually planned to include (1) the projection room proper; (2) a separate power room in which the motor-generator sets are mounted at a level above the ground to guard against damage from poor drainage; and (3) men's and ladies' rest rooms, which are frequently located at opposite ends of the building to insure greater privacy.

Plans should also include requirements for port-hole shutters and controls and two ventilation systems: one for the carbon-arc equipment and the other for the general ventilation of the projection room proper and the power room.

Construction of Projection Building

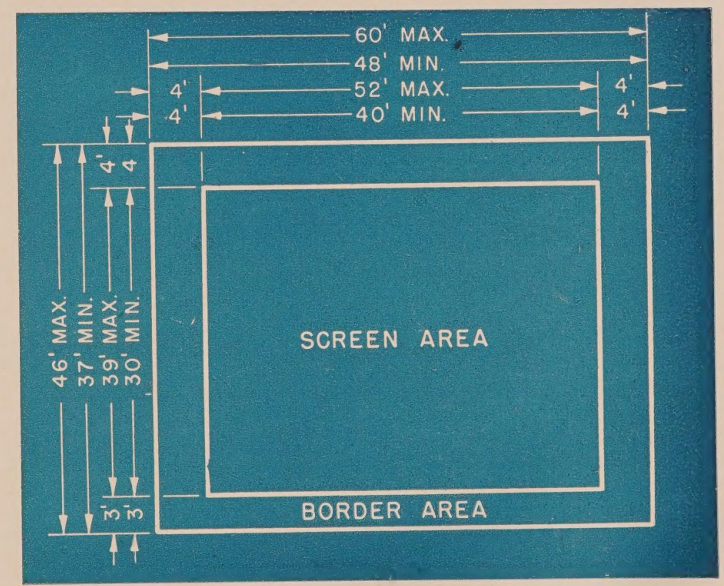
There are many factors which govern the location, design, and construction of the building housing the projection booth.

In the design of drive-in theatres, the location of the projection room building is of prime importance in securing the finest possible screen image. The projection room is generally placed from 150 to 250 feet from the screen, but so located that the light beam to the screen cannot possibly be obscured.

The minimum distance the booth may be located from the screen is determined by the maximum acceptable "keystone effect" and picture distortion. The maximum distance is determined by the longest focal length of fast projection lenses available, and by the projection angle required to clear the cars parked in the ramps directly in front of the projection booth.

The fastest projection lenses available at the present time have a speed of approximately f/2. With a 5-inch lens, the booth must be located 250 feet from the screen in order to obtain a picture 40 feet in with. Shorter focal-length lenses used in the above cases would provide a larger picture. With the booth a maximum of 250 feet from the screen, therefore, fast projection lenses may be used to obtain any size picture desired, within

THE SIZE OF THE SCREEN is particularly important in drive-in theatres, because of the great projection and viewing distances involved. Here (courtesy of Drive-In Theatres, Inc.) are given suggested measurements for two standard drive-in theatre screens, for the 40x30-foot and the 52x39-foot sizes. All the screens provide for a 4-foot-wide border at the top and sides and a 3-foot-wide border under screen area, for usual projection reasons.



the recommended range of 40 to 52 feet in width. The usual practice is to have the booth constructed on the third or fourth ramp. These ramps are approximately 200 and 240 feet, respectively, from the screen.

The projection room should be placed so that it allows the most efficient use of the lot area.

The projection building should be located in the center of the theatre so that the optical axes of the projectors are equidistant from the center line of the screen. The height of the booth above ground should be kept to a minimum so as not to interfere with screen vision from cars parked on the ramps behind the booth. In order to keep the height of the booth to a minimum, the floor of the booth should be approximately 30 inches below the ground level and the ceiling should not be over 8½ feet in height.

In the majority of the original drive-ins, the projection room was placed partially underground, so that the projection ports would only be about 18 inches above the ground level. This places the roof of the projection room only about 4 feet above the ground, so that it does not interfere with the vision from cars directly in back of it.

Reports from projectionists of drive-in theatres now show the desirability of building the projection building above the ground, because below-ground installations were afflicted with water seepage and lot drainage, which caused considerable difficulty with electrical wiring. The loss of revenue from the resulting lesser car spaces is more than offset by the decreased maintenance expense.

The floor and the walls of this building should be constructed of concrete and sealed to prevent seepage. Concrete walls are necessary only to a height slightly above ground level. Wood frame, metal laths, and plastered walls, topped with a flat composition roof may be used with concrete walls.

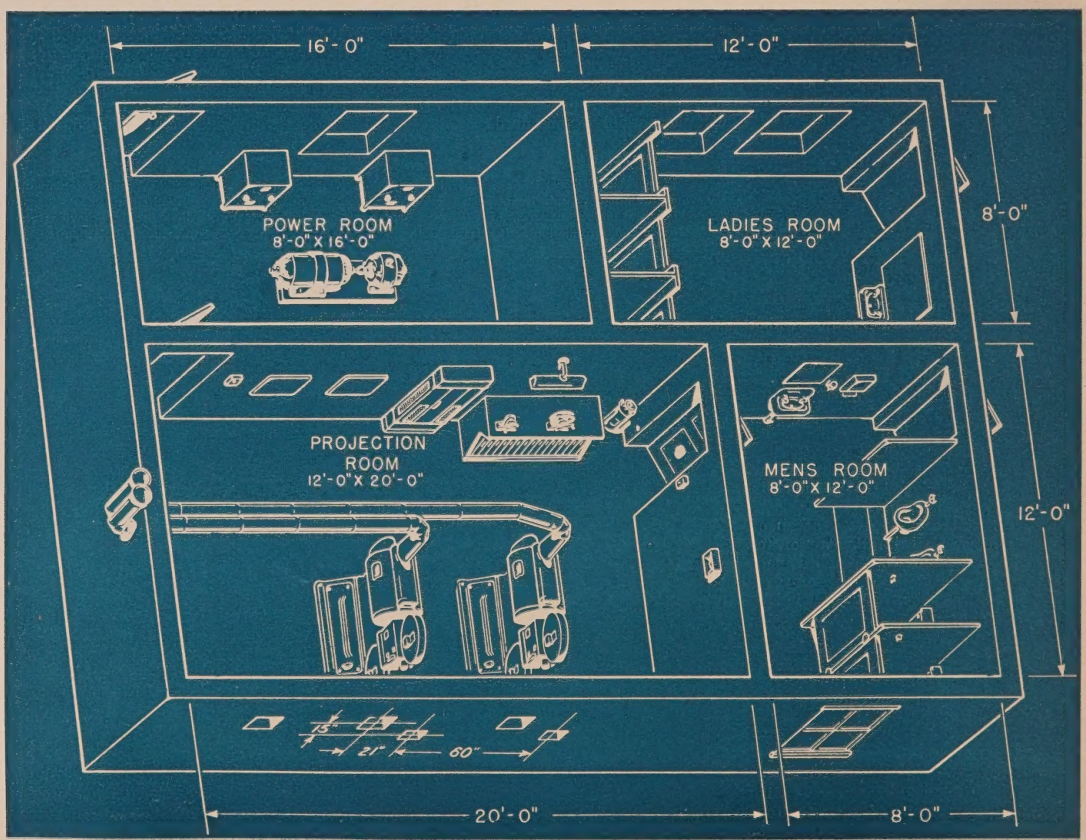
Space should be provided in this building for an arc-lamp power room. The power room should be at ground level or slightly higher. Electrical wiring conduits should be mounted on the ceiling and walls above ground level to eliminate the possibility of water getting into the electrical circuits, as well as to make better accessibility.

The rest rooms are located adjacent to each other at one end of this building, for economical construction. It is believed by some drive-in theatre owners, however, that more privacy is afforded by having the rest rooms located at opposite ends of the building.

A fence or bushes should be placed along the sides of the projection building towards the screen to prevent spectators from walking or driving through the projection beam.

In order to obtain maximum efficiency of light transfer from the arc lamp to the screen, there should be the fewest possible number of light obstructions in the light path from the arc lamp to the screen. Anything placed in the light path, such as glass, wire screening in projection ports, or shields on the arc lamp reflector, will retard the passage of light and result in decreased efficiency. For example, some projectors have a glass partition placed between the shutter and arc lamp to keep drafts from disturbing the arc. Even though the glass is kept perfectly clean at all times, a minimum of 8 percent of the light will be lost because of reflections, and when the glass becomes dirty or coated with carbon dust, the loss increases. This loss of light is serious in a drive-in theatre, where all available light must be utilized in order to illuminate the screen properly.

THE PROJECTION HOUSE OF THE DRIVE-IN THEATRE, besides being the location for the projection apparatus and associated equipment, is also the site of the ladies' and men's rest rooms. As a projection booth, the lay-out is not dissimilar to that described elsewhere in this volume for the standard, indoor theatre. While this Radio Corporation of America drawing does not show a separate rewind room, it is not improbable that the structure could be designed so as to include this feature. The men's room serves also as the projection room lavatory. Dual exits are provided the projection room, via the men's room and the power room.



Notes on Equipment for Drive-In Theatres

Individual Loudspeakers Main Deviation From Apparatus Used In Enclosed Cinemas

The careful selection of equipment is of prime importance to insure highest entertainment values. In terms of equipment, drive-in theatres are divided into two general groups: (1) theatres up to 600-car capacity and (2) theatres over 600-car capacity.

When selecting the projection and sound equipment, it is important that many factors be considered to insure sufficient illumination on the screen and sufficient power to operate the speakers at the required volume level without distortion.

Although standard theatre projection equipment may be used in most cases, it is important that the equipment be such as to provide an adequate source of light, high efficiency of light transmission to the screen, and rock-steady projection.

For reproduction of sound, standard theatre sound heads are suitable, but amplifiers of considerably more power must be employed, especially where the individual speakers are permanently installed on the field, or where in-car speakers are used.

PROJECTION LIGHTING

The drive-in theatre screen has an area of approximately three to five times that of the screens used in large enclosed theatres. The average size of the screen used in an enclosed theatre seating 2,500 is approximately 24 feet wide, with an over-all area of 432 square feet. To illuminate this entire area and this screen to the intensity recommended by the Society of Motion Picture Engineers, it is necessary to use either a Suprex type of lamp, using 8-mm. Suprex positive carbons, operating at their maximum current carrying rating of 65 to 70 amperes, or to use the super-high intensity lamp, using 13.6-mm. carbons operating at 125 amperes. Using the same types of lamps in a drive-in theatre with a screen 40 feet wide, and with an over-all area of 1,200 square feet, the intensity of light on the screen would be only one-third as great; and used in a drive-in theatre with a screen 52 feet wide, and having an over-all area of 2,028 square feet, the intensity of light on the screen would be approximately one-fifth as great as in the enclosed theatre using a screen 24 feet wide. If insufficient light is used on the drive-in theatre screen, operation cannot start until it is completely dark, thereby further limiting the available showing time with a resultant decrease in revenue. It can be seen, therefore, that it is extremely important that a drive-in theatre be provided with a powerful light source, together with the necessary projection equipment to transfer the maximum amount of light to the screen.

Fortunately a large screen does not require so great an intensity of light as small ones for good visual acuity, because, for example, it is easier to read large print than it is to read small print under the same lighting conditions. It is for this reason that a standard theatre arc lamp operating at from 65 to 76 amperes will give satisfactory illumination on large drive-in theatre screens, provided that the projectors, lenses, and operating conditions are such as to result in maximum efficiency of light transmission to the screen.

PROJECTORS

Projectors are available today in both the single-shutter and double-shutter type. The double-shutter type allows the transmission to the screen of approximately 20 per cent more of the available light than the single-shutter type and is, therefore, preferred in all drive-in theatres.

In laying out the projection room, it must be borne in mind that the projection angle must be up instead of down. The projectors should be mounted on special reverse incline concrete or metal bases.

RECTIFIERS AND GENERATORS

Either a motor-generator or copper-oxide rectifiers are recommended for furnishing current to the arc lamps, however, generators apparently are a much more favored arc lamp power source.

The motor-generator selected should be one designed especially for operation with Suprex type of arc lamps. It should be rated at 70 to 75 amperes for continuous operation without over-heating, and double this value for five minute periods so that change-overs may be made without any decrease in screen illumination.

Copper-oxide rectifiers selected for drive-in theatres should be designed for continuous operation at 70 amperes without over-heating. It is important that the rectifiers be operated below their maximum current rating, and be adequately ventilated at all times, otherwise they will become excessively hot and deteriorate rapidly.

LENSES

The long projection distances and unusually large screens required by drive-in theatres justify that careful attention be given the selection of the best optics available for illumination and picture definition.

The use of fast, long focal-length projection lenses would permit the construction of the booth at the back of the parking area. This would mean that more space would be available for cars and it would also mean that the booth could be constructed above the ground level, thereby eliminating the danger of flooding during rainy periods.

But projection lenses with a speed of f/2 have the greatest advantage of transmitting to the screen the greatest percentage of light available from modern projection arc lamps. As the speed of the lens is decreased, the efficiency of light transmission decreases very rapidly. As an example, when an arc lamp is being used with an optical system capable of filling an f/2 projection lens, approximately twice as much light will be transmitted to the screen as would be if a projection lens, with an optical speed of f/3 were used with the same arc lamp. It can, therefore, be seen that the speed of the projection lens is extremely important.

Accordingly, for the best projection results, the use of f/2 projection lenses is suggested. While this type of lens has been available in focal lengths up to five inches, it is desirable to lay out the theatre so that the projection room be within the range of the screen permitting the use of these lenses. The high speed of the f/2 will transmit the full cone of illumination supplied by the optics of the light source and place on the screen all the light science has thus far made available for this purpose. The longer focal lengths make the problem of crisp definition less severe so that a less involved formula makes these lenses exceptionally transparent to the passage of light.

Projection lenses of the coated type are much to be preferred, because of their greater efficiency and freedom from reflections and glare. Coating the lenses results in increased light-transmission efficiency of approximately 20 to 30 per cent, and in a definite improvement in picture definition and color fidelity when projecting color pictures.

SCREEN

Most of the drive-in theatres already constructed have used a 30 x 40-foot screen and have had about 10 ramps. This size screen has proved very satisfactory for this number of ramps. If additional ramps are required, the screen width should be increased five feet for each additional ramp. It is important that the screen be high enough above the ground so that cars parked on the ramps directly in front of the projection room will not be in the line of projection.

The distance of the bottom of the screen above the ground varies from 16 to 26 feet.

In localities with a great variation of weather conditions, it is advisable to paint the screen once each season.

Plastic screen paint, which will permit an even higher quality of projection, will shortly be made available. This paint will be impervious to weather conditions to which drive-in theatres are subjected and will be of a type which can be easily restored by use of a chemical cleaner.

SOUND SYSTEMS

The success of the drive-in theatre is dependent to an important degree on the

quality of its sound reproduction. As the result of experience with many installations a great deal has been learned about the types of sound systems which provide the most satisfactory results.

There are four general types of sound reproducing equipment in use in drive-in theatres: (1) the in-car type of loudspeaker, where an individual portable unit is provided for each car, (2) the now obsolete underground type of loudspeaker unit which is permanently installed in a suitable concrete housing underground. Such speakers supply two cars with sound through a metal grille which is mounted flush with the ground, (3) the above-ground type of loudspeaker system, where each unit is permanently installed in a weather-proof baffle mounted either on a pipe or post several feet above the ground and intended to supply two cars, (4) the central stage-type of loudspeaker system, where the components are centralized at the screen and serve as a single sound source to cover the entire area.

Those portions of the sound reproducing system which are located in the projection building are identical to those which are utilized in large theatres. Sound reproducers are identical, although in most of them more powerful amplifiers are employed in order to obtain the increased power that is necessary. Some sound systems have been powered with as little as 30 watts, though far better results are obtained with powers of 100 or more watts.

Some sound systems are also utilized with separate power amplifiers for each group of 50 speakers. In such cases a number of power amplifiers are required, but unless the theatre area is filled with cars, there is no necessity to utilize all of the power amplifiers, as the ushers can spot the car in front of the speakers which are powered. As the lot fills up, additional power amplifiers and additional groups of speakers are put into use.

Up to the present time, there have been five general types of individual speakers used. These can be classified into (1) those permanently mounted beside the car, and (2) those which can be taken inside the car, commonly called in-car speakers.

There have been three types of permanently mounted speakers: (1) permanently mounted on bulkhead in front of car, (2) permanently set in the ground between cars and covered with a metal grille, and (3) permanently mounted on a pillar beside the car window.

Speakers

In order that the reasons for the use of the speakers recommended today may be fully appreciated, some of the speaker designs and sound distribution methods used in the past will be briefly discussed.

The centralized speaker system used in the first five drive-in theatres. It consisted of wooded directional horns and dynamic cone-type speaker mechanisms, similar to those used in enclosed theatres at the time. In order to cover the parking area with sound, it was necessary to operate these speakers at their full capacity, and this resulted in frequent speaker failures. In addition, considerable trouble was experienced with sound escaping outside the theatre lot. People residing close by to the theatre complained bitterly and in many cases, theatre owners were served with injunctions and attempts were made to close their theatres.

It is evident, therefore, that a new speaker system would have to be devised for drive-in theatres. The most obvious, and the simplest solution at the time, was the use of a small speaker and baffle installed along each ramp directly in front of the car. As a matter of economy, one speaker unit was mounted so that it would serve two cars. At about the same time, experiments were conducted with small speakers installed underground, adjacent to the parking positions.

The use of individual speaker units permanently installed along the ramps did not entirely prevent the sound from escaping to surrounding areas. Considerable trouble was also experienced with speaker failures, because the first units were not 100 percent weather-proof. In addition, it was still difficult to hear comfortably during cold or rainy weather when the customers closed the car windows.

In the stage type of loudspeaker system, the necessary acoustic power is transmitted from what is essentially a single source at or near the screen.

Since this single source is intended to supply sound to the entire theatre area, it is apparent that this concentration of energy may involve serious disturbance problems to neighborhoods immediately surrounding the theatre location. Indeed, in some localities this form of sound distribution is prohibited by local authorities. It is recommended that this aspect be investigated in every case before serious consideration is given to its adoption.

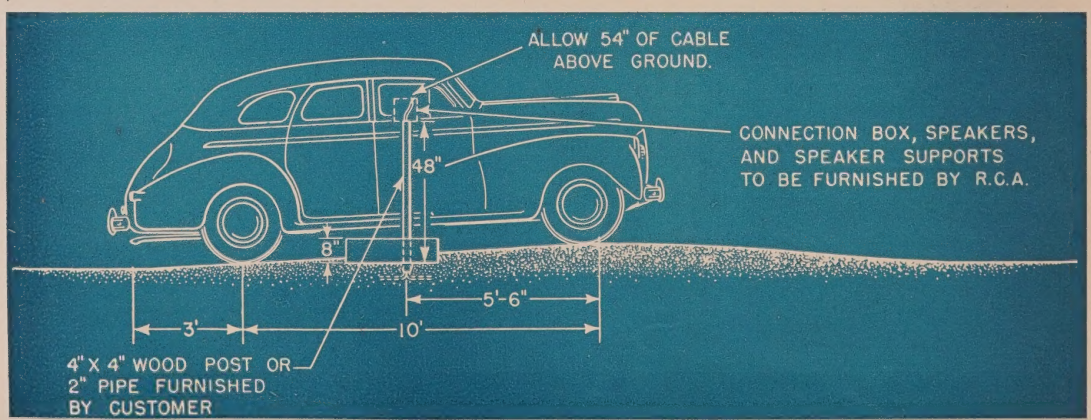
This type of distribution offers marked and obvious advantages in the way of low initial equipment cost, lower wiring and installation cost, and reduced maintenance expenses. Where it proves practicable, therefore, this type of system is preferable. Such a system would include high and low frequency units, multicellular high frequency cellular horns, folded horns, and a dividing network.

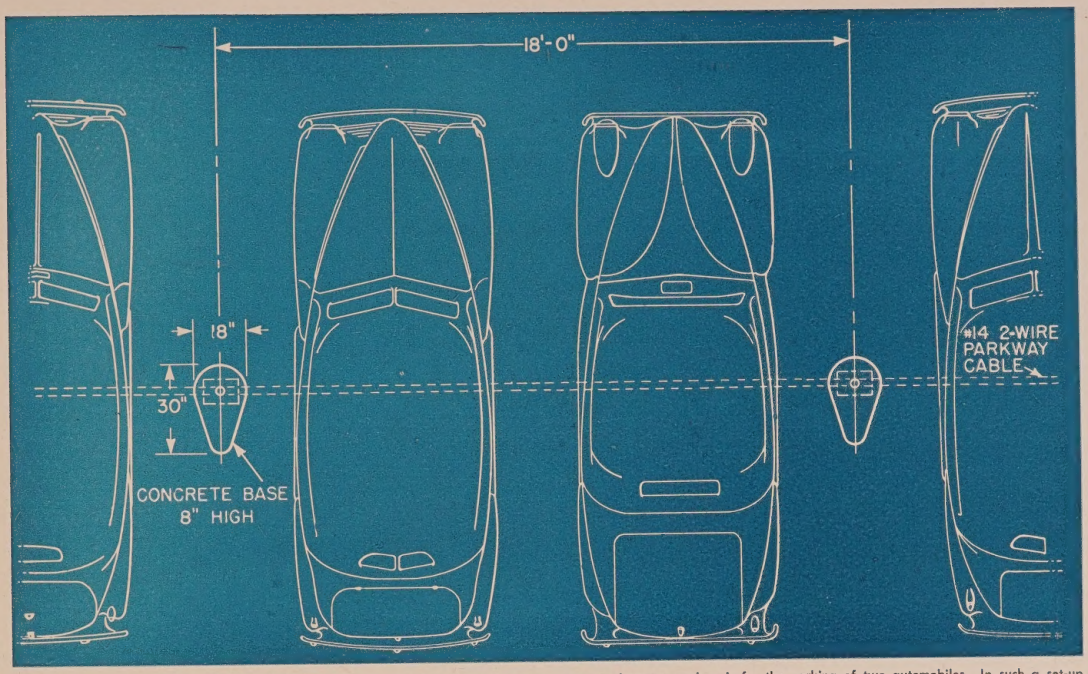
As the theatre area to be served is large, it is obvious that the speaker system must have more components than those existant in the average indoor theatre. A combination of four high frequency units, eight low frequency units, two folded horns, and two multi-cellular metal horns would be adequate for even the largest drive-in theatre.

If a sound screen is employed, the baffles can be mounted behind the screen. The use of a sound screen requires protection facilities, however, during periods when the theatre is not in use; therefore, in most cases the screen consists of suitable white-painted building board, or tin, backed with wood, and in instances the loudspeaker baffles must be mounted above, below, or at the sides of the screen.

There were several disadvantages inherent in the centralized speaker system. During rainy or cold weather, when it became necessary to keep the car windows closed, it was extremely difficult for the patrons to hear plainly even

INSTALLATION OF THE CONNECTION BOX, SPEAKERS, AND SPEAKER SUPPORTS is shown in this Radio Corporation of America drawing. These items are furnished by the company, but the customer provides the 4x4-inch wood post or the 2-inch pipe in which the equipment is mounted. Besides showing the critical measurements in the installation of this equipment, the drawing also shows some of the characteristics of the modern graded ramp, through the use of which the forward part of the automobile is raised sufficiently that all occupants will be able to see over the car in front. Speakers for two cars are mounted on each standard.





INSTALLATION OF SPEAKER STANDARDS in relation to parked automobiles is shown in this Radio Corporation of America drawing. The 18-inch high concrete base is pear-shaped and approximately 18 inches wide by 30 inches long, with the blunt end towards the screen. Standards are placed 18 feet apart, providing ample space between each pair for the parking of two automobiles. In such a set-up, the speakers are conveniently placed well within the reach of the occupants of the car. The underground circuit for the speaker system is composed of No. 14, 2-wire parkway cable. As a safety factor, base of the standards may be illuminated.

though the sound equipment was pushed to its maximum capacity. This not only increased the amount of sound escaping from the theatre, but it also over-taxed the equipment. Another disadvantage of the centralized speaker system was that, when the screen was viewed from the rear ramps, the reproduced sound was not synchronized with the action of the screen. The reason for this condition is that sound travels extremely slowly compared with the speed at which light travels—approximately ¼ mile (or 1,266 feet) a second compared with 186,300 miles a second—and the light from the screen would reach the last few ramps a fraction of a second sooner than the sound.

Pole-type speakers for drive-in theatres located at least three-quarters of a mile from residential communities, where operators do not wish to install the in-car speakers, provide excellent sound reproduction with greater control and flexibility than the central speaker system at the screen.

These speakers consist of specially designed directional horns, mounted on poles at least 30 feet in height and usually placed at intervals of about 100 feet at the sides of the parking area. In most cases eight horns will suffice to handle the sound for theatres up to 600 cars.

These speakers are individually controlled from the projection booth and can be cut out when cars have left the area with no impairment of the sound quality in the other parts of the theatre.

In above-ground type of speaker system, a permanent magnetic speaker unit is usually employed. In this form of sound distribution system, each unit is intended to serve two adjacent cars.

The units should be mounted in suitable weather-proof housing baffles, permanently installed on posts placed approximately 19 feet apart and on a line 2 or 3 feet ahead of the car front bumper locations.

The advantages of this type of distribution are essentially confined to the permanency of the installation, the need for fewer attendants as compared to the in-car type of system, and the fact that no loudspeaker handling is necessary.

The above-ground mounting by its very nature does not provide for the free movement of cars over the theatre area which is inherent in the underground type of system. Damage to posts and speakers sometimes obtains as a result of poor driving.

The above ground type also requires that at least one window in each car be kept open for optimum intelligibility, and in this respect the disadvantages correspond to those associated with the system employing the underground type of unit.

Either a metal or wooden baffle may be utilized, but either should have directional characteristics, so that interference from one speaker to nearby cars is minimized.

The weather-proof baffle is recommended where a metal baffle is desired. The baffle is designed to accommodate the unit, and is of sturdy construction. The unit has directional characteristics, which are essential to this type of loudspeaker layout if interference from any one speaker to nearby cars is to be minimized.

Where it is not desired to employ the metal baffle, a satisfactory and lower-cost substitute has been used in the form of a wooden combined baffle and weather-proof housing made by outside suppliers specializing in this type of product. These baffles are satisfactory from a performance standpoint provided the proper directional characteristics are obtained through correct design.

The underground type of speaker does not have the sound reproduction qualities of a central speaker system but has an advantage over the in-car type of speaker, inasmuch as but one speaker is required to service two cars.

Advantages of this method of distribution include (1) fewer attendants are required, (2) movement and placing of cars is not so critical, since they can drive over the grille, if necessary, to facilitate placing and exit, (3) no loud speaker, handling, plug-in, and so forth, are involved.

It is, therefore, less costly, both from the standpoint of a lesser number of speakers and loss through theft.

The disadvantages of this system are (1) high installation cost, (2) difficulties arising from water, dirt, and pebbles getting into the speaker units, and (3) the necessity of keeping at least one of the car windows open for good reception.

In this form of sound distribution system, each unit is intended to serve two adjacent cars. Each unit should be mounted in a suitable housing underground, and the entire assembly contained in a concrete bowl or cavity over which is placed a metal grille through which the sound energy emerges to the

area immediately above.

The locations are spotted so that the grilles are approximately 16 feet apart on a line corresponding to the front-wheel locations of the cars for any one row. To obtain suitable protection against weather, it is mounted in the housing in an inverted position, with the cone face downward; sound energy is reflected upward through the grille from the lower concrete bowl surface.

Generally a small permanent magnet-speaker unit and a matching transformer are utilized. Each unit is mounted in a housing underground, and the entire assembly is contained in a concrete cavity over which is placed a metal grille through which the sound energy emerges to the area immediately above.

In-car type of speakers—Theatre operators who have changed from the central or broadcast type speaker system to in-car speakers have reported substantial increases in grosses, due no doubt, to advantages of this type over all others, which include: (1) excellent intelligibility and sound quality, brings the source of sound to each customer, (2) car windows can be kept closed in wet or cool weather without sacrifice to sound reproduction, (3) a greater number of cars can be accommodated in a given area, due to no space requirements for speakers between cars, (4) confines sound to theatre area with minimum change of annoyance to surrounding community, and it can be safely used within a quarter of a mile of residential communities, (5) volume level can be adjusted to each individual customer's satisfaction, (6) it can be used in closed cars, extends operating season, permitting theatres to open earlier in the spring and close later in the fall.

The in-car speaker was introduced in 1940. The first in-car speakers consisted of an 8-inch speaker mechanism mounted in a rugged sheet metal case, with a bracket attached for hanging the unit on either the car door or some other convenient place inside the car.

To meet this demand, two types of in-car speakers have been designed especially for drive-in theatres.

In-Car Speaker, Stationary Type—Metal posts installed between each two cars carry two speaker units hanging from hooks and protected from the weather by a metal shelter. Each speaker is fastened to the post with a cable sufficiently long to allow it to be taken inside the car or fastened to the window edge. When the patron leaves, he disengages the speaker from the car and either hangs it back on the hook or lays it on the speaker shelter.

The speakers are provided with specially designed rubber bumpers to protect them against careless handling. To insure against patrons pulling out terminal wires, the lead wire to the speaker carries a strong steel cable.

These speakers remain on the post for the entire season.

The large majority of drive-in theatres built in the next few years will probably be equipped with in-car speakers of this new, all-season type.

In-Car Speaker, Mobile Type — The second in-car type speaker is an individual unit, carrying a length of cable and connecting plug.

These are stored at the theatre entrance and furnished the customer when he drives in. When the car is in place, the attendant connects the cable plug to an outlet jack. On leaving the theatre, the connecting cable is withdrawn, and the patron hands the speaker to an attendant at the exit.

Both types of in-car speakers are small, light, and water-proof, and built to withstand long and rough service without damage. A volume control on the side of the speaker will permit the patron to adjust the sound level for most pleasing reception and a convenient bracket on the back will make it possible to have them on the window ledge or any convenient place inside the car. At some drive-in theatres, a speaker is issued to the occupants of each car as they enter the theatre. After the car has been directed to a parking space by an attendant, he plugged the speaker into the closest connection block installed along the ramps. When the car was ready to leave, the occupant disconnected the speaker cord from the connection block and handed the speaker unit to the attendant at the exit. The disadvantages of this method are (1) the speakers require considerable handling, necessitating several attendants and subjecting the speakers to considerable abuse, (2) the speaker cords are subjected to considerable abuse when patrons disconnect them when leaving the ramp, and (3) the traffic flow is retarded because of the time consumed in issuing and collecting the speakers.

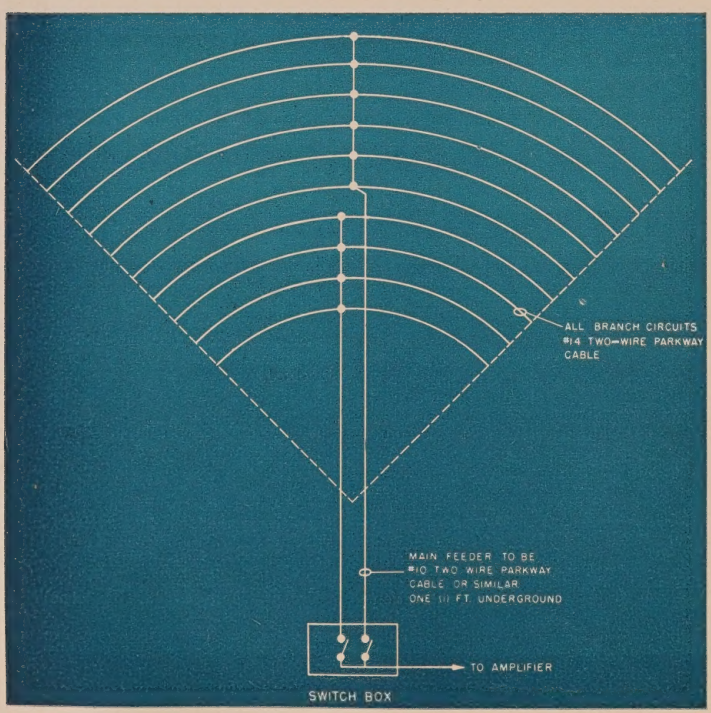
Speaker Equipment—The most successful method is to have the speakers permanently located at the parking spaces on the ramps, so that when the car drives up on the ramp, the speaker will be adjacent to the car window and can be reached by the patron without leaving the car. In order to use this method, the speaker units must be weather-proof as they are exposed to the elements approximately 24 hours a day. If they are not designed to withstand moisture and high temperature, considerable trouble will be experienced with inferior sound and speaker failure.

Speakers, which meet all of these requirements, are small in size, light in weight, styled very attractively, and 100 percent weather-proof. A volume control located on the front of the speaker permits the patron to adjust the sound level to his satisfaction. A bracket attached to the speaker permits it to be hung on the edge of the car window or on any convenient spot inside the car.

A combined terminal box and speaker receptacle which has many advantages over the previous types of in-car speaker housings has also been designed. The combined terminal box and speaker receptacle has been designed so that it is very easy for the patron to obtain and replace the speaker in its receptacle without leaving his car.

An important feature of the new RCA in-car speaker unit is that in the event of a speaker unit or speaker cord develops a short-circuit, the operation of other speakers will not be affected. Considerable

RAMP WIRING OF THE SPEAKER SYSTEM can be done in one of two ways. Here in this Radio Corporation of America drawing is shown the way of wiring two general portions of the parking area. From the control switch box, located in the projection room, it is possible to turn on the speakers of the first four ramps, or of the last six, or both at once. In this system, the operations chief would, at the evening's start, direct cars to but one area.



trouble was experienced in the past with the failure of one speaker unit causing a sound outrage over the entire field. At one location, it was reported that pranksters would deliberately cause a short-circuit by sticking a pin through the speaker attached to the in-car speaker in their car, thereby short-circuiting a complete section of the field, and, in some cases, the entire field. Oftentimes, considerable difficulty and time was experienced in locating and correcting this trouble. Using this RCA method of connecting speakers, a short-circuited cord can only affect the two speakers connected to their respective terminal box. This not only allows the rest of the speakers in the parking area to continue operating normally, but it also positively indicates the location of the trouble so that it may be quickly corrected.

In-Car Speakers Equipped With Hearing Device—To enable the hard-of-hearing to enjoy outdoor theatre entertainment, many drive-in theatre operators are providing in-car speakers with a special plug-in jack for the easy attachment of hearing aids.

For this purpose, there are available well-known devices, consisting of attractive, individual lorgnette receivers, which may be either of the air or bone conduction type.

Theatres which have advertised this feature report regular and steadily increasing patronage from those who are handicapped by impaired hearing.

Amplifiers

To provide sound of better quality and greater volume for with broadcast type or individual speakers, the new and improved amplifier equipment consists of a pre-amplifier (which may be mounted on the front wall), driver stages and a series of up-to-date power amplifiers, the number of which depends upon the number of individual loud-speaker outlets.

The pre-amplifier is fed directly from the photocell through high impedance coaxial cable. Included in the amplifier case is the volume or fader control and the sound change-over switch. One such amplifier is associated with each machine. In the main amplifier, the driver amplifier includes facilities for equalization of the sound characteristics. The feed-back circuit which serves this purpose also reduces distortion and permits parallel operation of amplifiers where required.

The driver amplifier feeds a bank of power stages, each of which is selected to provide ample power output for an optimum number of loudspeaker outlets operated in parallel, and suitable switch facilities are provided which will permit emergency interchange of power source to the various groups of speakers in case of failure of one or more of the power stages.

Complete emergency operation can be assured through installation of dual pre-amplifier and driver amplifiers with suitable controls to permit transfer from an inoperative unit to standby equipment. The exciter lamp power unit also includes an emergency feature.

A special switching arrangement provides flexibility between amplifiers and loudspeakers so that only those actually required need be in operation as the others can be cut out in any section of the theatre.

The amount of power necessary to operate an in-car speaker at the volume level required by most people is approximately 0.2 watt. This is a very small amount of power and only a very small amplifier would be required if it were necessary to operate only one speaker unit. However, inasmuch as an in-car speaker is required for each car parked in the theatre, an amplifier must be provided which is powerful enough to furnish at least 0.2 watt to each speaker. This means that a theatre with a capacity for handling 400 cars requires an amplifier output of at least 400 times 0.2 watt; and a theatre with a capacity for handling 600 cars requires an amplifier with a power output of at least 600 times 0.2 watt, or 120 watts.

One of the problems which was encountered when a standard theatre amplifier was used for drive-in theatre operation was the necessity for the operator to be continually adjusting the amplifier volume control to maintain the proper average speaker volume level when the number of speakers in use was increased or decreased.

RCA, for example, has sound systems designed especially for drive-in theatres, which overcome these difficulties. In designing these systems careful thought was given to all of the factors involved in the reproduction of sound in a drive-in theatre, such as adequate power for operating a large number of speakers, correct frequency range for use with individual speakers, adequate emergency facilities, and economical operation.

An exclusive feature of the RCA amplifiers is that it is unnecessary for the projectionist to be continually changing the amplifier volume control in order to maintain the proper average speaker volume level, as the theatre fills up and more speakers are placed in use, or when the show is nearly over and the number of speakers in use progressively decreases.

New circuits recently developed by RCA automatically compensate for speaker-load changes on the amplifier so that, once the volume has been adjusted to the proper level, it will remain practically constant, regardless of the number of speakers in use.

INSTALLATION OF EQUIPMENT

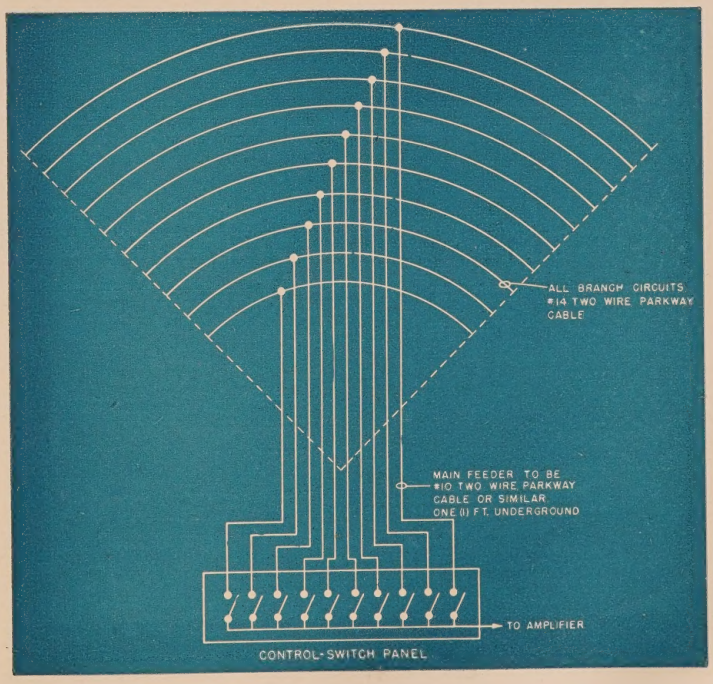
Projection Booth Installation

The installation of the projection equipment in a drive-in theatre booth differs very little from an enclosed theatre booth installation. Perhaps the most important rule to follow is to mount the equipment above the floor level, so that it will not be damaged in the event the booth becomes flooded.

The installation of projection and sound equipment in the projection room of drive-in theatres is, in general, made in the same manner as in the regular indoor theatre. However, since the floor of the projection room is below ground level, some seepage may occur even though the structure is carefully waterproofed.

It is essential, therefore, that all of the

WIRING ALL RAMPS SEPARATELY is the second system. Shown in this Radio Corporation of America drawing is the general plan for controlling, from the control switch panel in the projection booth, the speakers of any particular tier of stalls, any group of tiers, or all of them. In both cases, No. 10, two-wire parkway cable is used between control panel and the tier, with the tier itself wired with No. 14, two-wire parkway cable.



equipment be mounted and the conduits run in such a manner that any seepage will not enter the units or penetrate to the wiring.

Projector pedestals should be raised from six to eight inches above the floor and the conduits run along the walls and ceiling rather than under the floor.

The amplifier rack is mounted on a concrete block about 6 or 8 inches high in order to keep the amplifier equipment above the floor level. The conduit for the inter-apparatus wiring is run along the booth walls or ceiling and not under the booth floor.

Concealing the conduits will greatly approve the appearance of the installation.

If in doubt about seepage, lead-covered cable in rigid conduit with water-tight joints and water-tight outlets will insure against moisture entering the wiring systems.

All wiring outside the projection room should be underground and moisture-proofed by one of the approved methods. These runs are usually somewhat longer than in the indoor theatre and it is essential that the size of the wire be selected with a knowledge of the length of the run and the power to be transmitted to insure that the power delivered is adequate and that regulation is within the operating limits of the equipment.

Ramp Wiring

Considerable care must be used in laying out the underground cables from the projection booth to the speaker locations in order to prevent damage to the cable, and to minimize power leakage caused by rain and humidity. Even with the large amounts of audio power available, from the new RCA Drive-in theatre amplifiers, it is essential that the power loss in the feeder lines and speaker connections be kept to a minimum value. Loose underground connections, partially shorted underground connections, water-soaked splices made underground, and water-soaked cable have been the causes of considerable trouble in many drive-in theatres in the past, resulting in interrupted and inferior performance.

An improved underground cable such as impregnated jute parkway cable or tellurium parkway cable could be used between the projection booth and the speakers. The cable is usually buried 12 inches below the surface to protect it against damage from maintenance tools and from the frost. The impregnated jute parkway cable is protected by a non-metallic armor, made of layers of vacuum-impregnated jute with weather-proof compound applied between the layers. These hard layers of impregnated jute protect the cable from mechanical damage and moisture and result in the cable having an unusually long life when buried directly in the ground.

The tellurium parkway cable uses a rubber insulation and tellurium-rubber sheath. It is lighter in weight, easier to handle, more flexible, and more resistant to soil acids and alkalis than the impregnated jute cable. Although the tellurium parkway cable is slightly more expensive than the impregnated jute cable, the extra features of the former type make it preferable.

In-Car Speaker Installation—For in-car speaker installations, an underground wiring system from the projection room to and along each of the ramps is necessary to provide power for these units.

It is important that this wiring be properly designed and installed to prevent the entrance of moisture and sound failures.

The wiring should not be less than 12 inches below the surface to avoid damage from maintenance.

Where ground freezes to greater depths, the experience of local reliable contractors should govern the depth of the wiring.

It is recommended that a circuit consisting of two No. 10 conductors be run from the projection room to each ramp for connections to the speaker outlets.

This wiring should be of a type that will not permit the entrance of moisture and will not be affected by any acids or alkalis that may be present in the soil.

The parkway type of cable may be used for this purpose, but the most satisfactory type of wiring is rigid conduit containing two-conductor lead-covered cable.

There should be no splices below ground, all splices being made in water-tight boxes above ground so that no moisture can enter the splice and also so that it may be readily inspected.

The speaker outlets must be of rugged water-proof construction and securely fastened to a rigid support in the proper location with respect to the position of each car. It is important that the outlets be positioned so that they will not be damaged by the car bumper.

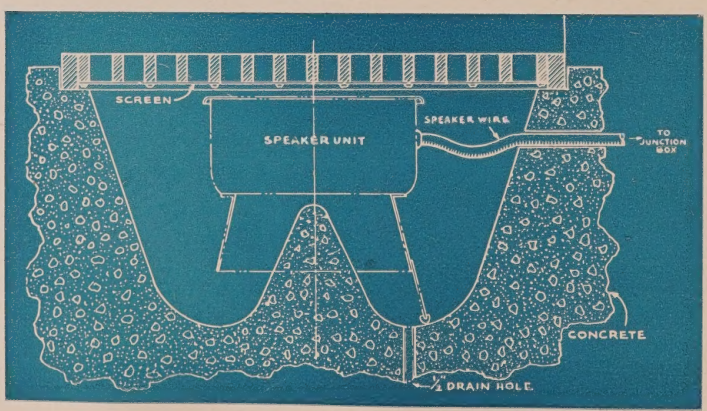
When one circuit is run from the projection room to each ramp, switches may be provided in the projection room to disconnect that circuit from the output of the amplifiers in case of trouble. Thus, whether the difficulty is in the wiring or in one of the speakers on a given ramp, the circuit can be isolated without affecting speakers on the other ramps.

Several different methods have been used for wiring the in-car speakers to the projection booth. Here, it will be noted that only one trunk line using No. 10 parkway cable is run down the center of the parking area, and No. 14 feeders are used to feed the speakers on each of the ramps. All of the feeders should be connected to the trunk line above ground. No connections should be made underground. The disadvantage of this method is that if a short circuit develops in the trunk line or in any of the feeder lines, all of the speakers will be affected until the short is located and repaired.

The in-car speaker installation is such that when the car is properly located on the ramp, the in-car speaker will be directly opposite the car window and may be easily reached and easily returned without the patron's leaving his car. It will be noted that one speaker mounting post with two in-car speakers is positioned to serve two cars. The recommended distance between speaker mounting posts is 18 feet.

In wiring the parking area, a separate No. 10 parkway cable is run from the booth to each ramp and No. 14 parkway cable is used to feed the speakers. Switches in the booth are connected between each trunk line and the output of the amplifier, making it possible to control or isolate sections of the parking area from within the projection booth. If one trunk line develops a short circuit, it will simply be necessary to open the switch in the booth which controls that particular trunk line. This will disconnect the shorted line from the amplifier, and permit operation of all ramps except the one to which the shorted trunk line is connected.

THE UNDERGROUND TYPE OF SPEAKER, as formerly used in some drive-ins, is sketched in this drawing (courtesy of Motiograph and The Sound Track). A concrete reverberation chamber, with a speaker unit inverted over the bowl portion and covered with a grille, is sunk into the parking area. Such speaker, while eliminating speaker standards, has some objections which are common to speaker systems which must serve more than one car.



Illumination of Speaker Standards

It has been found desirable by some drive-in theatre owners to illuminate the base of the speaker standards so that the drivers may more easily guide their cars to the correct location on the ramp. Illuminating the base of the speaker standard also greatly reduces the possibility of cars running into the speaker standards and damaging them.

The illumination is provided by a low-wattage lamp mounted on each speaker standard and shaded so that all of the light is reflected to the base of the speaker standard. Electric power must be provided at each speaker standard for these lamps.

A Brief Consideration of 16-mm. Theatres

Potentialities of 1945-1946 Equipment Sufficient to Service 400-Seat Cinemas

The war taught many lessons and showed the way to new uses for old materials and old uses for new materials, and raised many an item from comparative obscurity to a place of major importance.

To the motion-picture industry, accustomed to think, a priori in the terms of 35-mm. film and equipment, came the realization that 16-mm. films and equipment, while still a midget in size, was truly grown up and was taking a man's place in a man's world.

THE PICTURES THAT COULD BE

That American motion-picture industry has recognized this fact became manifest when Arthur M. Loew, president of Loew's International Corporation, announced that his company would distribute on 16-mm. film the Metro-Goldwyn-Mayer features and short subjects produced for 35-mm. distribution in the United States.

Said Loew at the time, "The war has given tremendous impetus to the improvement of 16-mm. projectors, sound and film, and today narrow-gauge film approaches 35-mm. quality when projected before audiences of less than 1,000. I do not believe 35-mm. will be discarded in favor of 16-mm.; far from it. What will happen, in my opinion, is that 16-mm. film will open up a new audience for pictures that 35-mm. has either never reached or barely touched. These are the people who live in isolated communities or in towns too small to support a regular theatre. Mobile projector units, similar to the mobile units that have followed our soldiers wherever they have gone. By this means, no location on the face of the earth is too remote by 16-mm. films."

The program as outlined by Loew, while carrying entertainment features and short subjects, centered on educational pictures which the producing unit would soon start to make. More than giving Hollywood a new power in the foreign market and among alien races and peoples, the move might, he continued, "open up new vistas for the film industry and be the forerunner of fundamental changes in world-wide distribution."

Not long after Loew made his announcement, there were similar declarations by Joseph A. McConville, foreign manager of Columbia Pictures Corporation; J. H. Seidelman, president of Universal International Films, Inc.; and Leon Britton, Far Eastern supervisor of RKO Radio Pictures, Inc. All three emphasized that only the foreign market (excluding Great Britain) was encompassed in the 16-mm. programs.

In England, as in this country, too, there is at present a traffic in peddling entertainment from 16-mm. motion-picture films, with the shows presented by itinerant entrepreneurs anywhere that a place and an audience can be found.

That the English motion-picture industry is likewise eyeing this situation with considerable interest is attested by agreements signed at the year's beginning by Tom Law, in the name of the J. Arthur Rank interests, and by Joseph McNabb, president, for the Bell and Howell Company. The pact involves a mutual interchange of research, manufacture, and distribution of both films and equipment.

Thus has the world's motion-picture industry, through the performance records hung up during the years of war, become acutely conscious of the potentialities of entertainment, no less than training and educational, 16-mm. motion pictures.

THE THEATRES THAT MAY BE

Concurrent with all this discussion, now come into the open, architects and theatre planners have not been idle. But rather have they been busy designing theatres which could meet the demands of the potential market.

In this connection, it was not unnatural that a couple of other war-developed ideas would come to the fore: the use of the new plywoods, with and without plastics added in the lamination process, and the use of pre-fabricated structures.

While primarily designed for the showing of 35-mm. motion pictures, chief entrant in the pre-fabricated field is the all-steel theatre conceived and designed by the National Theatres Amusement Company, Inc., and being turned out, in experimental models, at least, by mills of the Henry J. Kaiser organization.

Runner-up—but in some ways more interesting because of the ingenious designs and the remarkable versatility of the materials—is the plywood theatre that might be developed along the lines of the buildings erected by Unit Structures, Inc. While no theatre has been built of these laminated arches and plywood panels, churches, auditoriums, and similar structures have, and, naturally, there is no reason why a theatre could not be. Yet here the greater potentiality is in the 35-mm. field.

As the only known entrant in the field for post-war theatres for the exclusive showing of 16-mm. entertainment films is the plastic-plywood conception of Morris Sanders, New York's famed architect, designer, and innovator.

For those communities with a hall, but without a theatre and even the questionable ability to support one over a period of time after the novelty had worn off, yet the while communities which would, periodically, patronize motion-picture performances, there is the "itinerant booth", proposed by William C. DeVry, president of the DeVry Corporation.

Inasmuch as these various topics have been exhaustively treated in other articles in this volume, nothing further need be said on the details.

Another aspect of 16-mm. theatres might be mentioned at this point. Frank Lawrence, formerly with United Artists, Metro-Goldwyn-Mayer, and other of the larger studios, has been working on plans for a nation-wide organization for the construction of a series of 16-mm. theatres for the exhibition of commercial and industrial films. To date, there are no theatres available for the exclusive showing of such pictures.

THE EQUIPMENT THAT IS

Since Hollywood has admitted that the pictures are ready and that 16-mm. entertainment films for commercial exhibition are here, and since theatre designers —of the orthodox type, no less than the pre-fabricators—are ready to develop cinemas to this exclusive purpose, what about the equipment that will or might be put into those halls and auditoriums that are now and the theatres that are to be?

On the subject of 16-mm. equipment for theatre use—commercial exhibition, if not for actual, "man-size" theatres—the manufacturers have very little to say, and what is said is said only after the hearer is virtually sworn to secrecy. However, from time to time a gleam breaks through the gloom and registers a point, and now, enough of these points having been made, a pattern begins to resolve.

In the first place, it is violating no confidence to say that the equipment is ready for the commercial exhibition of 16-mm. motion pictures. Some 10,000,000 servicemen can attest to that fact.

Indeed, it was the war that gave the industry the shot in its design and production arms, to turn out equipments which, while 16-mm. in size, would be as close to 35-mm. in performance as it was humanly possible to make in the time allowed.

But let us look into the details, and find out, if possible, what may reasonably be expected, as maximum capabilities, of the present-day equipment. This material is set forth here in summary in the firm belief that it represents good, fair cross section of the present state of affairs.

Viewing Distances

In the last analysis it is the human eye which establishes the maximum comfortable viewing distance since it is that organ's ability to distinguish details (eyemen call it "resolving power" of the eye) in pictures of various sizes. When a person is seated at a distance equal to six times the width of the screen, he can see (if his eyes are normal) practically

all the details in the picture upon the screen. If he sits at a greater distance from the screen, his eyes, however good, will not be capable of registering the finer details, and, as the distance is increased, the resolving power of the eyes becomes less and less. It is curious to note that increasing the screen illumination beyond the recommended brilliance does not increase the maximum viewing distance.

As is well known from personal experience, the screen picture gets blurred and seemingly out of focus as it is approached. While the eye will endeavor to adjust itself to these characteristics, as well as the irregularities of film motion, it cannot, for naturally, it cannot register a sharper image than it sees. The point at which these phenomena come in, and there eye becomes easily fatigued because of the large field of view, is approximately two screen widths away.

Thus, the seating area of a 16-mm. theatre would have to be within a space represented by not more than four screen widths, with the nearest seats no closer than two screen widths.

Room Illumination

Motion pictures appear best when projected not in a totally black room, but when there is about 0.1 foot-candle of light, a level sufficiently high to bring the screen illumination into correct balance but not high enough to bring the surroundings inadvertently to noticeable and distracting attention. A 0.1 foot-candle can popularly be that amount of light by which ordinary newspaper printing can be read only with difficulty when the paper is held 10 inches from the eyes.

Screen Illumination

Regardless of how nearly ideal may be other conditions for looking at motion pictures, if the screen illumination is not sufficiently bright the picture cannot be comfortably viewed. If the picture is too bright, the contrast between the picture and the surrounding will be too great and the picture itself will appear too grainy, and eye strain and fatigue will result. If there is not enough light on the screen, the eyes will not be able to resolve the details of the picture, and again the eyes will suffer. The Society of Motion Picture Engineers has suggested a screen brightness of 10 foot-lamberts for auditoriums having the 0.1 foot-candle of general lighting.

Screens

For 16-mm. motion pictures, there are two common types of screens, the white matte and the beaded.

The white matte screen, which, when new, reflects about 85 percent of the light falling upon it, is to be preferred because of its more uniform reflectivity and because it may be satisfactorily looked at over wide viewing angles. The projector, for a screen of this type, in order to furnish the 10 foot-lamberts of screen brightness, must project upon it 12 foot-candles of light.

The beaded screen, while reflecting more light than the white matte screen, varies greatly in reference to the viewing angle. Because a beaded screen throws the greatest portion of the light back at the source, persons seated farther off the line of projection would receive increasingly less light from the screen, and, accordingly, each one sees on the screen a different degree of quality in the tones of the picture.

Maximum Length of Rows of Seats

When considering the maximum length of rows of seats, it should be remembered that the perspective changes with the various viewing angles. For example, when viewed from an angle of about 40 degrees, an oblong screen seems to be square, which means that the projected images appear about one-third thinner (but of the same height) than they actually are.

While the white matte screen can be used for wide viewing angles, this effect must be borne in mind when establishing the length of the row. Accordingly, the SMPE recommends that, for this screen, the maximum viewing angle be 30 degrees.

Seated at the end of a similar row, the view of a picture on a beaded screen gets the benefit of only one-quarter the brightness of a person seated in the center of the row. Accordingly, for the beaded type of screen, the SMPE recommends the maximum viewing angle be established at 20 degrees.

Projection Lamps

While there are some arc lamps made for use with 16-mm. (Ampro Corporation's Amprosound Model AA uses a Strong Electric Corporation Junior High, 30-ampere, 28-volt carbon arc lamp), most of the available data are referable to incandescent projection lamps.

Assuming that the film is black-and-white and the room has the recommended 0.1 foot-candle of general illumination, the power of the lamp depends to a large extent on screen size and the type of screen. For example, a 5-foot-wide white matte screen would require a 750-watt bulb, while a beaded screen a 200-watt bulb. Maximum screen width for a 1,000-watt bulb is about 8 feet, for the white matte screen, and 12 feet, for the beaded screen.

Projection Distances

The length of throw is dependent on two main considerations: the focal length of the lens and the width of the desired screen picture.

For example, for pictures from 4 to 12 feet wide, a 1-inch projection lens would have to be moved back from a distance of 10½ feet to 32 feet; a 2-inch lens, 16 feet to 48 feet; a 3-inch lens, from 32 feet to 96 feet; and a 4-inch lens, from 43 feet to 128 feet.

An Example Is Offered

Suppose that a theatre man has the equipment about which he would plan to operate a theatre, and he decides that a 9 x 12 foot screen and incandescent lighting are what he wants, what will he have?

First of all, it is obvious that the closest seat to the screen is 24 feet away, with the most remote 72 feet removed. Now, assuming that, to play to the most people, he utilizes a white matte screen, he will find that the front row will be 28 feet wide and the back row 84 feet wide. From these figures, and assuming that he can set up 20 rows of 24-inch-wide chairs, spaced 32 inches back to back, the maximum seating capacity is about 360.

In view of the fact that there are 10,000 35-mm. theatres presently operating in this country with seating capacities of less than 500, it is apparent that the present equipment could well be used by probably hundreds of existing theatres and by added hundreds of communities now devoid of motion picture entertainment.

PASSING CONSIDERATIONS

At present under discussion in Hollywood's technical centers—and in test by some manufacturers—is a new type of narrow-guage equipment, designed to utilize 20-mm. film.

This size has been set up as a possible compromise—35-mm. films for commercial theatres, 8- and 16-mm. for amateur cinematographers and for non-theatrical (even though of entertainment) films, and the 20-mm. for commercial exhibition in situations where no theatres exist today.

While the set-up may be a good one, from the standpoint of denominating the three provinces of motion-picture use, it is felt in some quarters that the new equipment will have to be sold at a price so in excess of that presently charged for 16-mm. items that it would be economically inadvisable to use the new models in the situations for which the 16-mm. has been proposed.

A more likely avenue of approach to the problem of sturdy equipment, built to stand the gaff of commercial operation—which, it is admitted, may be bought for present machinery to do—is the creation of new pedestal models devised strictly from the standpoint of a permanent theatre job to be done. Of the 50,000 16-mm. sound projectors reported to have been purchased by the Armed Services, only a relatively few, probably because of the nature of their destinations and field use, were of what one might call the permanent, pedestal type, such as would be a prime requisite in a theatre model.

In the redesigning of the equipment to develop a theatre model, it might be possible to build in a 4,000-foot reel, and thus be able to put one hour and 52 minutes of show on a single reel. Such a reel would eliminate the need for a second projector and associated items of equipment, particularly since the rewinding necessary for the second show could be easily effected while the new audience was being seated.

But the most pressing need is, as should be obvious from the foregoing discussion of equipment, in projection lighting. While the bulb lighting may be all right for very small audiences, not much bigger than one might have a party in his home, theatre projection lighting will probably have to be by means of arcs. It has proved the most satisfactory, even in the smaller of the 35-mm. theatres, and the audiences of the 16-mm. theatres deserve the highest quality that the equipment is able to deliver. Perhaps the answer to projection lighting, including that for 16-mm. films, lies in the principle of "regimented light," recently described by the Western Union Telegraph Company.

SECTION 3 - E

PUBLIC HEALTH

1945

Ultraviolet Air Sterilization in Theatres

Summary of the Basic Findings of Science; Notes on Use of Certain Commercial Units

Men of science have long recognized the fact that bacteria-laden air, arising from common occupancy of enclosed spaces, constitutes a universal hygienic hazard, since such diseases as colds, influenza, measles, whooping cough, scarlet fever, and diptheria may be transmitted by air-borne germs.

To curb possible cross infection and epidemic spread, investigators determined that ventilation equivalent to 100 complete changes of air an hour is necessary to secure any marked reduction in the transmission of air-borne contagion. Since the installation of an air-conditioning and ventilation system to meet such a terrific load is engineeringly impracticable and economically inexpedient, other solutions were sought.

As early as 1877, it was demonstrated that the sun's rays are a powerful sanitizer, and that is due to the invisible, ultraviolet rays. Practical difficulties beset the efforts to develop a lamp which would make possible a practical application of this fact of nature. It was not until the mid-thirties that light scientists and engineers learned to control the infra-red (heat) waves, the visible radiation, and the excessive ozone production and, thereby, to develop a practical generator of the germicidal ultraviolet rays. The obstacles were overcome largely through the perfection of a special glass, capable of transmitting approximately 80 per cent of the radiation at about the 2537 A.U.* point, the very peak of ultraviolet's bactericidal power.

The installation of germicidal lamps presents a clinically-proved and economical means of making safe the air in a confined space. The germ-killing capacity of a properly installed system is equivalent to from 100 to 500 complete changes of air an hour, an efficiency far in excess of anything than can be accomplished by mechanical ventilation.

Lamps Useful in Many Places

Germicidal lamps, now being made available to theatres, follow the successful application of the device to other fields. In hospitals, the lamps are used over operating tables to throw a barrier of germ-killing ultraviolet light around the patient. Nurseries are equipped to prevent transmission of infection from one infant to another and from nurse to infant. Business offices, stores, and factories are supplementing air-conditioning with germicidal-lamp conditioning. The lamps are also aiding in the prevention of contamination in blood-plasma laboratories, in penicillin-producing plants, in food and beverage processing.

Possible Use in Decoration

In devising lights to give a definite result, there is no way of achieving the end of having a single, exclusive wavelength —there is always a spread. Accordingly, with lamps designed to furnish light in adjoining bands of the spectrum, there would, by the very nature of things, be some overlapping.

The utlization of fluorescence involves the so-called black light, which, within the range of 2,500 to 4,400 A.U., causes the characteristic glowing. The peak in this range is around 3,600 A.U. On the other hand, the germicidal band ranges from 2,000 to 2,800 A.U., with the peak at just above 2,500 A.U. Thus, it will be noted that in these two types of lamps there is an overlap between 2,500 and 2,800 A.U. where the germicidal lamp has also properties of "black light."

When germicidal lamps are used in units, and some of the light hits the wall above the point of fixture attachment, there is the possibility that the interior decorator might develop a decorative scheme which would take advantage of this "extra added" property.

Extreme care must be used in selecting colored or patterned material for areas subject to ultraviolet irradiation. In the same way that the actinic rays of the sun cause fading, so the germicidal lamp, being much richer in such active rays, will also induce a fading. Accordingly, the decorator must know his fabrics, and select for use in these places only those that are definitely colorfast.

THE UV GERMICIDAL LAMP

In appearance, germicidal lamps are generally slender, rod-shaped glass tubes. A faint blue light is given off when the lamp is in operation, but the rays dealing death to air-borne microbes are invisible.

Commercially available in various lengths—with 30-inch size the most economical for theatre use—the lamps may be used singly or in groups of as many as four in series and wired on a special transformer.

The lethal power comes from a high concentration of ultraviolet rays, produced by an electrical discharge between the electrodes through a mixture of inert gases and mercury vapor in a tube which will transmit the bactericidal wave lengths of natural sunlight.

About 80 per cent of the radiant-energy output of these lamps is confined.

Ozone Charcteristics

Radiation of wavelengths shorter than 2,000 A.U. forms ozone from the oxygen in the air. The amount is controlled by the transmission properties of the glass envelope of the lamp, and also by the 2537 A.U. radiation, that decomposes the ozone and converts it back to "ordinary" oxygen. Humidity is also an important factor, as the higher the humidity the less the concentration of ozone.

Ozone is also destroyed by the absorption on or contact with various surfaces, by oxidizing vapors and gases, and, to a slight extent, by spontaneous decomposition.

The amount of ozone produced by a cold-cathode lamp is rarely above 0.04 to 0.15 part to one million parts of air. Incidentally, ultraviolet lamps produce only pure ozone, and never any nitrous oxide (laughing gas) or the poisonous nitric oxide.

The maximum amount of ozone permissible for human tolerance, according to the National Bureau of Standards, is, for prolonged exposures, 0.5 part to one million parts of air. So, the amount of ozone that is generated by a germicidal lamp is well below the tolerated peak.

While ozone is a powerful oxidizing agent, it should be noted that, in all the duct installations supervised by the men of Westinghouse, there has been no observed oxidation (rusting) of the duct work from this cause.

The production of ozone might be thought by some to be objectionable, but this is probably a mere matter of personal opinion, as most people find it pleasant. Actually, the ozone can be beneficial, since it makes the air sweet-smelling and tends to keep down any molds which might cause a musty odor.

Destruction of Bacteria

It is beyond the scope of this article to describe in detail the experiments conducted in establishing the principles of ultraviolet light's germicidal power, but, here are a few of the considerations which are important.

In the first place, the method by which the bacteria are killed is interesting. Under the influence of ultraviolet light —and just a few seconds are sufficient to start the process—the bacteria start to swell, and, as the internal pressure becomes greater, vescicles are formed on their surface. Continuing the exposure, the bacteria continue to swell, until the internal pressure is so great that they actually explode.

While this process has actually been observed, photographing it has been almost impossible. Since the action is the same on microscopic animals—but those considerably larger than bacteria—and

* A. U., abbreviation for Angstrom unit, named for the great Swedish physicist, A. J. Angstrom (1814-1874), is the unit of wavelength, approximately 1/250,000,000 inch. Indicative of the spread and arrangement of the radiant energy spectrum, let it be said that ultraviolet ranges from 136 to 3,800 A. U., visible light from 3,800 to 7,200 A. U., infra-red (heat) from 7,200 to 4,000,000 A. U., and Hertzian waves and the radio bands from 4,000,000 A. U. In the ultraviolet band, the following areas are recognized: x-rays to 1,000 A. U., ozone formation from 1,000 to 2,000 A.U., germicidal from 2,000 to 2,800 A. U., fluorescent excitation from 2,500 to 4,400 A. U. and tanning and antirachitic portion from 2,800 to 3,300 A. U.

this has been recorded photographically, there is presented here a series of pictures showing the destruction of paramoecia.

Bactericidal action is determined by the amount of radiation to which the bacteria are exposed, regardless of whether a high intensity is applied for a short time or a low intensity applied for a correspondingly longer period.

The resistance of bacteria to ultraviolet radiation varies appreciably at different stages of the individual's life history.

The lethal action is not influenced by the temperature or humidity. It is the result of direct radiation apart from any environmental considerations.

The killing power of the lamps decreases as the distance from the lamp increases. For example, a given bacterium will be killed twice as quickly at three inches as a similar bacterium would be at six inches from the light source. There does not seem to be any stimulant effect by ultraviolet light, regardless of how low the concentration may be. The lethal power still effective at a distance of 18 feet from the lamp, provided the period of irradiation is sufficiently prolonged.

Maintenance and Replacement

Germicidal lamps require little in the way of maintenance other than the extremely important, periodic cleaning. Dust and dirt collection will interfere with the transmission of ultraviolet radiation. Paper towels moistened with alcohol or water have been found to be effective in wiping grease and dirt from lamps.

When being serviced in any way, germicidal lamps should be shut off, since exposure of the eyes to ultraviolet will produce painful conjunctivitis. If testing lamps or other reason requires coming in close proximity to ultraviolet radiation, a protective hood should be worn.

While these lamps do not ordinarily burn out, the ultraviolet output does decrease, falling below the specified requirements after 4,000 to 4,500 hours of use. Each lamp, accordingly, should be replaced after it has been in active service a full year.

For easy measuring of the amount of ultraviolet radiation, a meter, with a direct-reading indicator, and small enough to be carried conveniently in the pocket, is available.

Lamps are inserted or removed from receptacles, in duct installations, by loosening the metal ferrule on one receptacle and sliding it back about two inches to allow clearance for the lamp over the edge of the receptacle. When the lamp is in place, the receptacles are pulled forward and the ferrule is tightened in place.

Maintenance economy can be gauged by the fact that the Hygeaire 36-inch-tube model consumes less electricity than an ordinary bulb suitable for reading purposes. An electrical input of only 40 watts is all that the unit requires to produce 7.2 watts of germicidal ultraviolet energy. The low operating cost, including tube replacements and electricity, averages less than three cents a day for every 1,000 cubic feet of room volume. The 30-inch Westinghouse Sterilamp consumes about the same amount of electricity as does an ordinary 25-watt light bulb.

FIXTURED LAMPS IN UNITS

Germicidal lamps may be utilized in theatres in two ways, in specially-designed fixtures and in batteries placed within air-conditioning system. Since the latter may seem to be more desirable, it has been considered in greater detail by another autors, but unit utilization must be seriously considered.

It is desirable to have indirect radiation of the air above eye level in the theatre auditorium. If the air from a heating or conditioning system enters the room near the ceiling and leaves through vents near or on the floor, all the air above a six or seven foot level will be irradiated by germicidal ultraviolet units if these are placed along the walls. Where there are balconies, the placement of the lamps must be such as to prevent the direct rays from reaching the eyes of patrons in the balconies.

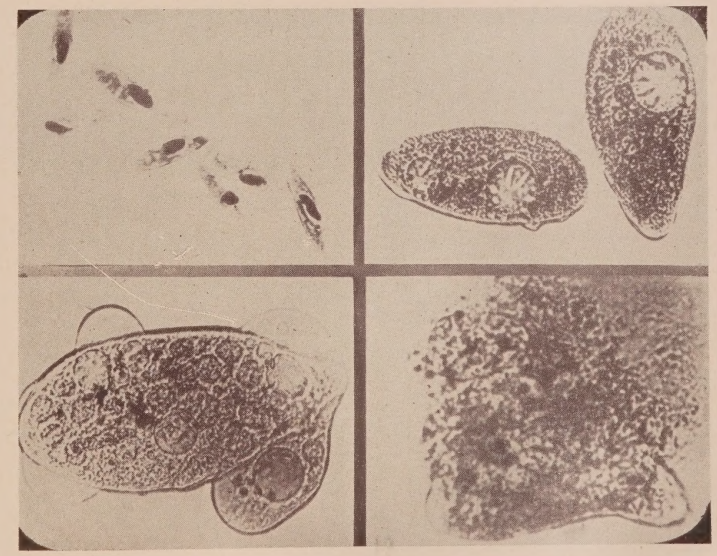
Louvres at right angles to the tubular lamp, spaced closely enough to hide the source of radiation, will prevent eye irritation but will absorb some of the germicidal rays. These louvres or shields must have non-reflecting surfaces. The fixtures should be constructed to prevent any of the visible bluish light from striking the wall above the fixture. Lighting of the walls not only may detract from the stage or screen lighting but also may result in fading of the wall finish or draperies. The distance of the fixture from the ceiling or the opposite wall is usually great enough to insure only a very small amount of visible reflection from those surfaces and no fading or interference with stage or screen. If the direction of air flow in the auditorium is toward the ceiling the arrangement of the lamp fixtures is quite the same as for downward air flow. In either case the germs from an infected person will be carried downward to the air outlet or upward into the irradiated area and seldom reach adjacent persons without first passing through an ultraviolet barrier.

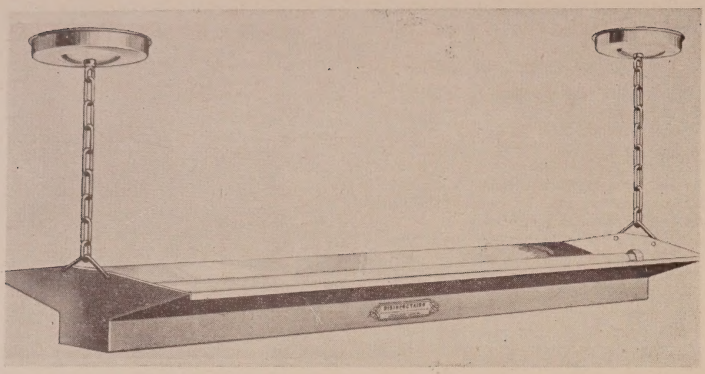
Auditoriums equipped with indirect germicidal ultraviolet radiation can be occupied with very little danger of spreading infections such as measles, mumps or colds as such germs and viruses are easily killed by the radiations. Tests made in school rooms in which indirect radiation was installed indicate a reduction in communicable infections to one third and even to one fifth of those in adjacent rooms where no radiation was used. There is greater protection against cross infection where the radiation is installed in the room itself than where it is necessary to place the lamps in the air duct or plenum chamber on an air-conditioning system. The air supplied to the room can be made practically germ free but there is always the chance that infection from one person may travel to another in the same room. The general level of contamination can be reduced by the constant addition of germ free air to the room and the removal of contaminated air. Under these conditions the level of contamination depends upon the number of air changes per hour and the number of persons in the room.

GE Germicidal Lamps

To those who congregate in theatres and public buildings, the General Electric Company germicidal lamps offer the equivalent of 100 changes of fresh air every hour. This fresh air means a hitherto impossible control of air-borne in-

HOW ULTRAVIOLET LIGHT KILLS micro-organisms is shown in this remarkable series of pictures. Upper left—normal paramoecia (commonly called, because of their shape, "slipper animalcules") in their natural condition. Upper right—After but 30 seconds of treatment by ultraviolet radiation, they become distended. Lower left—The distention continues with the exposure, the swelling becoming pronounced blisters where the cell walls have become weakened. Lower right—Finally, the internal pressure becoming too great, the organisms literally explode. Although bacteria cannot be photographed like this, the killing process is the same. (Westinghouse photo.)





CEILING FIXTURES like this one can be utilized in some portions of the theatre. The effectiveness of upper room air irradiation is obviously dependent upon the amount of circulation between the upper and lower areas, and the effectiveness of any installation can be greatly increased by forced air circulation. Ceiling fixtures of this type might, at times, be combined with fluorescent lighting. (General Electric Company photograph.)

fections that bring, in addition to more serious respiratory diseases, an estimated 400,000,000 colds a year with an annual loss in man-hours of around a billion dollars. Germicidal lamps can be effectively used in two types of installations in overhead fixtures and in the air ducts of ventilating and air conditioning systems.

Fewer than five changes of air an hour by door and window leakage represent average indoor winter ventilating conditions, which are universally regarded as bad. Because of the cost of heating outside air and the mechanical difficulties of circulating it, 15 to 20 additional changes of air are about all that can be secured by artificial means. It is believed that a sanitary ventilation of approximately 100 changes an hour is necessary to secure any marked reduction in the transmission of respiratory infections. With a correctly engineered installation of GE germicidal lamps, it is entirely practical to secure a sanitary ventilation equivalent to 100 air changes per hour.

The effectiveness of upper room air irradiation is obviously dependent upon the amount of circulation between the lower and upper areas, and the effectiveness of any installation can be greatly increased by forced air circulation. The amount of sanitary ventilation needed in any particular interior depends, among other factors, on the rate of contamination, generally proportional to occupancy, are relatively short.

Operation costs are relatively low. Depending on the amount of sanitary ventilation needed, assuming a maximum of 10 hours' operation a day, an average electric rate and a conservative life rating of the lamps, the operating and lamp replacement costs will range from one-half to three cents a day for each 1,000 cubic feet of room volume. As an example of installation expense, the original cost of a school installation can be written off in a year at the rate of only 2½ cents per 1,000 cubic feet per day of school operation.

The bactericidal ultraviolet barrier that can be created by General Electric germicidal lamps is comparable with the direct method of air irradiation in its effectiveness and in the uniqueness of the service they perform.

Although there are many ways of installing germicidal lamps in air ducts, the best compromise on the radiation and mechanical factors calls for placing them lengthwise on the duct wall, on 4- to 5-inch centers grouped on center half of the duct wall and out of the corners of rectangular ducts. Standard wiring channel strips, such as are used with the corresponding fluorescent lamps, may be attached to the outside walls of the duct with the lamp sockets projecting through holes in the duct walls and the reflector lining. Two-lamp assemblies using high-power factor ballasts and moisture proof lamp holders, especially designed for this type of installation, are commercially available.

Since, for effective operation, the germicidal lamp tubes must be kept reasonably free of dust, there must be convenient access for cleaning. This can usually be arranged by hinged panels on the sides or bottom of the duct, and, if necessary, the lamp may also be mounted on these panels as well as on the stationary duct walls. Where the mechanical conditions demand it, lamps may be installed end to end along the duct.

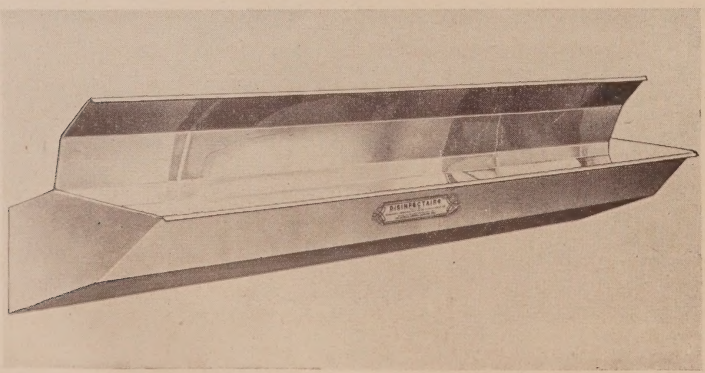
In any case, the reflector lining of chromium or aluminum should be used on all walls of the duct, and should extend beyond the ends of the lamps a distance twice that to the opposite sides of the duct. If chromium plated sheet steel is not available, aluminum foil surfaced building paper or board, or special aluminum paints may be used for the duct lining.

In large ducts or plenum chambers, germicidal lamps may be assembled like the rungs of a ladder in vertical frames, supported out in the center of the chamber in whatever series or multiple arrangement best fits the local conditions and provides access for cleaning and replacement.

In addition to the specific value of germicidal lamps in materially reducing certain types of infection, their general value to the theatre owner or operator lies in the fact that these lamps provide a new means of disinfecting air. Germicidal lamps offer a simple method of protecting patrons of amusement places against air-borne infection, an unique means of additional sanitation since there is today no other practical way of doing the job.

During the past war years, germ-killing ultraviolet light as generated by the GE germicidal lamps has been widely tested and effectively used in hospitals, schools and army barracks. Today, the germicidal lamp has definitely emerged from the experimental stage as a practical, inexpensive weapon against many air-borne infections. In the theatre, it has not only a practical, public service value, but a specific box-office value, particularly so in periods when colds and influenza approach epidemic proportions. The promotional possibilities of a germicidal lamp installation will be immediately apparent to every alert theatre operator.

WALL FIXTURES can be adapted to theatre auditorium use. Designed to beam a stratum of sanitizing ultraviolet light above the eye level, this wall fixture is used in areas where space is limited. A similar fixture has been designed to be used over doorways, where it is comparable with the upper-air method in effectiveness and the downward component also forms a definite germicidal layer in the air. (General Electric Company Photograph.)



Hanovia Safe-T-Aire Lamps

Hanovia Chemical and Manufacturing Company, pioneers in the design and manufacture of ultraviolet equipment, at an early period had developed low pres-

sure, ultraviolet lamps that were suitable for killing air-borne bacteria. Thus in the basic study of destroying influenza virus in the air by ultraviolet radiation (as reported in July, 1936, by W. F. Wells and H. W. Brown, of Harvard School of Public Health), Hanovia cold-cathode quartz mercury-vapor Safe-T-Aire Lamps were used. Safe-T-Aire equipment has contributed to the success of many other experiments and today Safe-T-Aire quartz and glass lamps can be found in many hospitals and offices, also in schools, homes, and so forth.

As regards application of the greatly advanced knowledge of air sanitation to theatres and other meeting places, this was given special attention by F. W. Robinson, head of Hanovia's laboratory and engineering staff. Practical methods for use of Safe-T-Aire Lamps in auditorium, lobby, smoke room, and the like, and in air ducts were evolved that will ensure a high level of performance.

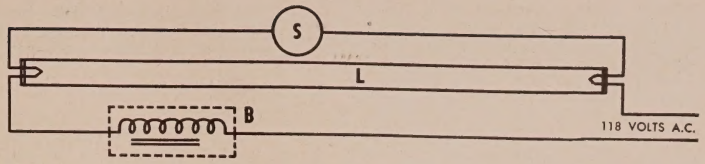
There is now little doubt that, once certain materials have become plentiful for civilian use, bactericidal lamps will be widely installed to flood the atmosphere inside the theatre with health-protecting, air-purifying ultraviolet rays, to serve the public and to increase attendance. In this connection Hanovia wall-and-ceiling suspension Safe-T-Aire lamps for direct and indirect radiation and duct equipment with long life burners, having an effective tube life of over 10,000 active hours, recommend themselves for safe and efficient service.

The Sperti Mercolites

The Mercolite is a scientific achievement, backed by many years of research and development in the laboratories of Dr. George Speri Sperti and the engineering and manufacturing experience of Sperti, Inc.

A concentrated source of powerful ultraviolet waves, the Mercolite tube maintains the exact selected wavelengths rquired for a particular function. The Mercolite, a hot-cathode type of tube, maintains constant tube temperature and, thereby, constant arc characteristics, assuring uniformity of operation in any atmosphere, temperature, or surrounding condition. The envelope is not of quartz, but glass, especially selected to control the wavelength and prevent the passage of shorter, harmful rays, including those producing ozone. Mercolite tubes are durable, guaranteed for six months, but they have an average service record of from six to ten months' continuous operation.

Of interest to theatremen, as having use in general illumination rather in auditoriums or air ducts, is the Healthaire fixture. The indirect type of fixture comprises three sources of light, two Mercolite tubes and one 300- or 500-watt ordinary lighting bulb. The downlight, found particularly desirable for high-ceiling areas and where high intensities are required over a specific area, has its elements wired in series and will operate on 100- or 120-volt, alternating or direct current. It has only two wires to connect, making it as easy to install as any ordinary fixture. The hanger (standard length: 43 inches over all) can be shortened, if necessary, without rethreading. The reflector bowl, of standard aluminum finish, prevents direct radiation below the light. The system, combining both types of light, effects color correction of artificial light, and produces, through the actinic and germicidal properties, ideal hygienic conditions for both eyes and body.

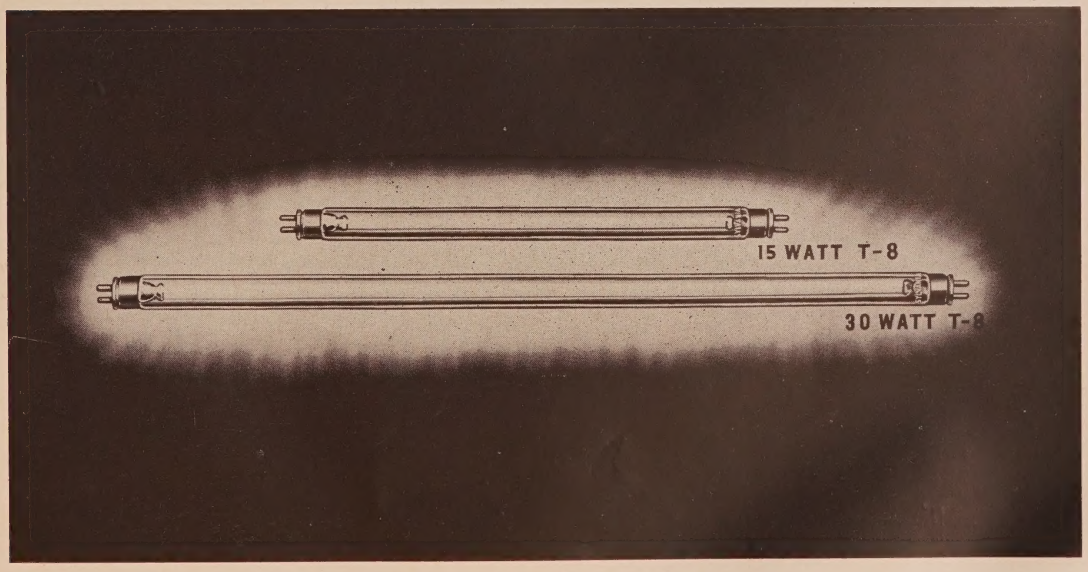


THE BASIC WIRING PLAN of the Sylvania standard germicidal lamp is shown in this diagram, where L is the germicidal lamp, S is the starter switch, and B is the ballast. The Sylvania lamp is a hot-cathode, low-pressure, mercury-vapor light source generating the great bulk of its energy at 2537 A.U., which is quite effective in the destruction of air-borne bacteria which are the cause of respiratory diseases. (Sylvania Electric Products, Inc., dia.)

The Sylvania Lamps

Sylvania Electric Products, Inc., has been carrying on experimental and development work on germicidal lamps for over 10 years, manufacturing at the present time the standard 15- and 30-watt sizes, each size having characteristics comparable to fluorescent lamps of equal wattage. There are also several

THE SYLVANIA STANDARD GERMICIDAL LAMPS are made in 15- and 30-watt size and are similar in size, shape, and operating characteristics to standard 15- and 30-watt fluorescent lamps. Any standard fluorescent fixture or electrical circuit for such lamps will properly operate these germicidal lamps. However, the porcelain or enameled reflector as used in the standard fluorescent fixture will absorb 90 to 95 per cent of the ultraviolet and, for this reason, a special reflector of aluminum (reflection factor, 70 per cent) or polished chrome (reflection factor, 50 per cent) should be used. (Sylvania Electric Products, Inc., photograph).



smaller types for special applications. At the present time, fixtures are not being manufactured, nor has the company carried on extensive promotional work, because in many instances the application requires special engineering technique, if the job is to be successful. Sylvania, for the present, prefers to have such work done through its own engineering department or through outlets having sufficient engineering data.

Sylvania manufactures a Type A and a Type B lamp in each size. The type A lamp produces a little more than half as much germicidal ultraviolet as Type B, but it utilizes a glass which does not transmit radiation short enough to produce ozone. These lamps are recommended for school rooms, offices, and similar locations where the general public would be exposed to air irradiated by the lamps for extended periods. Type B lamps, which utilize a glass said to be the same as that used by other manufacturers, produce enough ozone, particularly during the first 100 hours of operation, to be objectionable in many cases. Type B lamps could be used, for example, in a theatre's air-conditioning ducts where air turbulence, moisture, and heat would tend to eliminate the ozone.

Westinghouse WB-44 Units

The Westinghouse Electric Corporation's rather recent Sterilamp Conditioner, Model WB-44, combines the lamp, sockets, and built-in transformer into a unit. The reflector is designed to give ultraviolet radiation only in the space above the eye level. The styling and color of the fixture harmonize with wall and room decorations. It comes complete with an eight-foot cord, and is ready to be plugged into any convenient 110-volt, 60-cycle, alternating-current outlet.

WB-44 conditioners should be mounted six and a half to seven feet from the floor. Radiation is cut off at an angle of one degree above horizontal, shielding eyes from direct radiation. The horizontal spread of radiation, for maximum utilization comes when the unit is placed in the center of walls and not in corners where a portion of the radiation would be absorbed by the wall.

Table showing the number of Sterilamp fixtures recommended for sanitizing rooms of various areas and conditions of occupancy.

Floor space up to—	Number of WB-44 Conditioners for—	
	Limited Occupancy	Congested Occupancy
100 sq. ft.	1	1
150 sq. ft.	1	2
250 sq. ft.	2	2
300 sq. ft.	2	3
375 sq. ft.	3	3
500 eq. ft.	3	4
600 sq. ft.	4	4
750 sq. ft.	4	5
800 sq. ft.	5	5
1000 sq. ft.	5	6

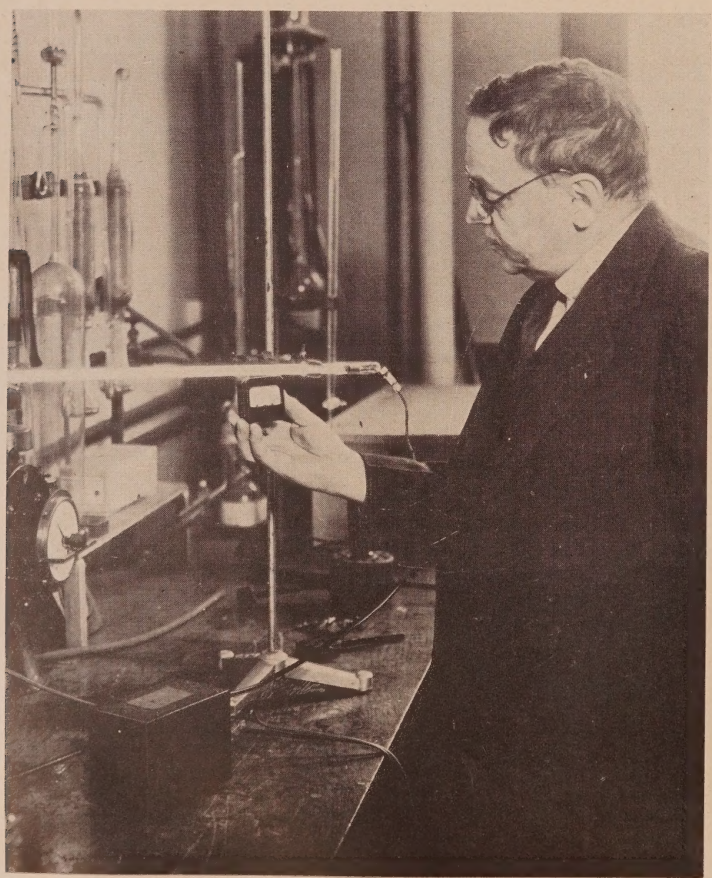
The number of units required is determined by the number of occupants of the room and, therefore, the amount of infection in the air, and by the area of the room. The accompanying table is calculated on the basis of providing a degree of air sanitation comparable to one complete air change every minute.

The use of germicidal lamps in rest rooms and lobbies should be considered. Not only are these areas of high bacteria count—and should, therefore, be sanitized—but the soft blue glow of the lamp, mounted in plain sight, constitutes highly effective advertising. With the aid of a sign, the patron can be constantly reminded that powerful ultraviolet rays of similar lamps, located within the air-conditioning system, protect him in any part of the theatre from infection by airborne bacteria.

In many cases the standing of a theatre is determined by the fittings and the maintenance of the rest rooms. Advantage should be taken of every sanitary aid to keep these rooms serviceable and attractive. Germicidal ultraviolet radiation is an effective agent in reducing odors and sanitizing wash bowls, toilet seats, and wall and floor surfaces. Rest rooms and smoking rooms should be equipped with indirect radiation while the toilet rooms may have direct radiation over the toilet stalls and wash bowls. Some shielding of the direct rays of a region 3 to 6 feet from the floor may be needed in some installations. One 30-inch St rilamp should be installed for the irradiation of two toilet stalls.

Sterilamps in a theatre are an aid to the box office during epidemics as they can be depended upon to reduce the danger of cross infections from patron to patron in the auditorium. In the lobbies where people may be crowded at times the ultraviolet radiation will reduce the bacteria count and to that extent reduce the danger of contagion. In air-conditioning systems the operation of the proper number of Sterilamps in the plenum chamber or air duct will insure the supplying of practically germ free air to the air conditioned rooms in the theatre. The treatment of the air by mans of germicidal ultraviolet is comparable in the purification of the air to the more common and better known purity controls of water and milk supplies. It is another element in the protection of public health.

FOR MEASURING THE INTENSITY OF THE GERM-KILLING RAYS, the Model SM-600 selective ultraviolet meter, an adaptation of the well-known light meter, has been developed. Here Dr. Harvey C. Rentschler, director of research for the Westinghouse Electric Corporation's Lamp Division, is shown measuring the ultraviolet strength of a Sterilamp, such as are considered here. Doctor Rentschler is one of the pioneers in the utilization of ultraviolet light as a practical means of effecting complete air sterilization. (Westinghouse Electric Corporation photograph.)



Air Disinfection for Theatre Auditoriums

Post-War Application of Hygeaire System Termed Practical Air-Sanitizing Method

By JOHN J. PERKINS
Associate Director of Research, American Sterilizer Company

Another notable advance in the rapidly expanding science of air sanitation is the adaptation of the Hygeaire system for the radiant disinfection of air in the theatre auditorium. This new development represents the first post-war application of the Hygeaire ultraviolet germicidal unit (manufactured by the American Sterilizer Company) for the improvement in environmental sanitation and for the practical control of air-borne infection in the public health field.

Ever since the commercial development some four years ago of the hot-cathode ultraviolet germicidal lamp, there has been a keen interest and a highly competitive effort among fixture manufacturers in an attempt to devise a practical means for the installation of the ultraviolet lamp within the theatre auditorium. During the war years, a premium on engineering time and skill prevented a careful study of the various factors involved in such installations, although some very definite contributions were made by certain scientific investigators in air-pollution surveys of both air-conditioned and non-air-conditioned theatres. As the result of insufficient technical data and information, progress in this field has been rather limited and in recent months additional complications have developed, due to a diversity of opinion as to the most efficient method for the disinfection of air within the theatre auditorium.

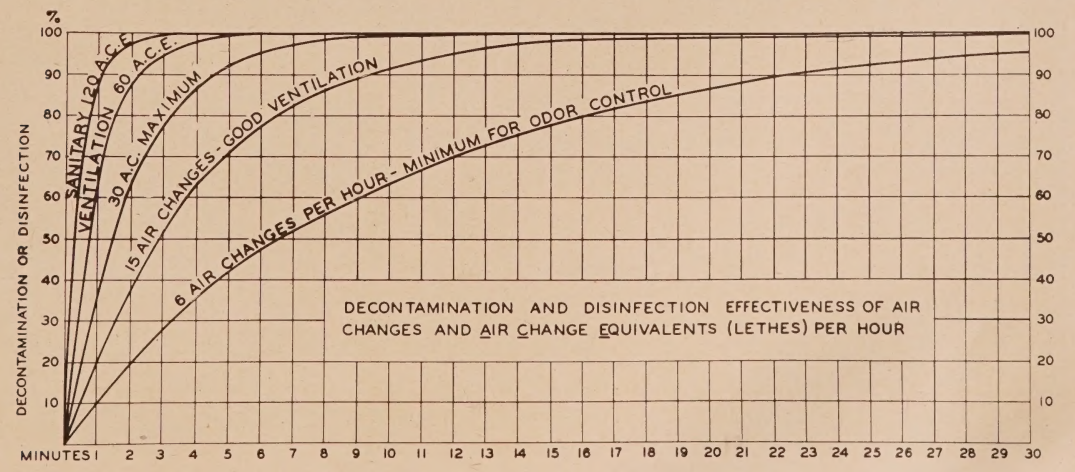
It is the duty of every theatre owner, manager, or operator to familiarize himself with the present concept of sanitary ventilation, its meaning, purpose and ultimate effects upon the health and well-being of his patrons. Two schools of thought, and two entirely different methods of approach to the problem of disinfecting the air within the theatre, are being promoted at the present time. Both of these methods are fairly simple in principle and each has its recognized advantages and disadvantages, even though the end result in either case is the destruction of air-borne bacteria, thereby assisting in the control of air-borne infections in enclosed spaces.

The first and possibly the most widely publicized of these two methods applicable to the theatre field is the installation of ultraviolet germicidal lamps directly within the air-conditioning system, sometimes referred to as a duct installation. In contrast to the duct type of installation is the method of direct irradiation of the air in the upper areas of the room in which the effects of sanitary ventilation are to be secured. This method is now recognized to be a simple and efficient method for the germicidal treatment of air.

VENTILATION AND INFECTION

When individual and adequate supplies of air can be furnished to each person, the problem of air-borne infections disappears. However, it is almost impossible to arrive at such an ideal under general living conditions, and it now becomes necessary for the purpose of this discussion to determine just how much can be done by ventilating procedures to limit the spread of air-borne infection. Almost everyone now recognizes that in sneezing, coughing, spitting, breathing, and speaking, bacteria and viruses are projected into space. These agents are disseminated in droplets of diverse sizes. Droplets larger than 0.1 millimeter in diameter will respond more rapidly to gravitational force and will settle out a short distance from their point of origin. Eventually such droplets will dry and become part of the dust. The future of the organisms they contain will depend on the steps taken to render this dust harmless. The behavior of droplets of smaller size is somewhat different and the buoyancy of the atmosphere helps to maintain them in a state of suspension for long intervals, and air currents may transport them for long distances. When these smaller droplets of less than 0.1 millimeter in diameter evaporate they leave behind a residue of fine dust like particles in which disease producing germs may be incorporated.

FIGURE 1.—Decontamination and disinfection effectiveness of air changes and air-change equivalents (lethes) an hour are shown. From an inspection of the curves, it would appear that from 60 to 120 air changes an hour would have to be maintained in order to have, of itself, any value in the prevention of the spread of respiratory diseases by air-borne bacteria and viruses. Air conditioning systems of such capacities are hardly feasible either in economy of operation or efficiency of performance. (Permission to use this chart has been granted by Dr. L. J. Buttolph, of the General Electric Company's Lamp Department, Neia Park, Cleveland).



Since, in breathing the air of a crowded room, one is actually inhaling to some extent the nasopharyngeal flora of other occupants of the room, it is desirable to apply adequate procedures for the circulation and dilution of the air. Under theoretically ideal conditions the displacement of air from a room by blowing in purified air from the outside in an amount equal to the volume of the room (one turnover) will reduce the concentration of dispersed micro-organisms to approximately 37 per cent of the original value. During winter months, when rooms are kept closed, ventilation occurs chiefly through the seepage of air around windows and doors, accounting for less than ten turnovers of air an hour. Sanitary ventilation is defined in terms of the venting of air-borne micro-organisms, that is, the number of turnovers of air an hour required to reduce the number of micro-organisms to the unit volume to a concentration level equivalent to that resulting from their killing by chemical or physical agencies. The removal of organisms can take place by transfer in air currents, chemical destruction, killing by irradiation, or displacement during washing or filtration. Any method resulting in reduction equivalent to 25 to 100 turnovers of air an hour is considered to give fair sanitary ventilation, while reduction equivalent to less than 10 turnovers represents poor sanitary ventilation.

A draft is produced when air is changed more often than six times an hour or if the velocity of air flow is more than 3 to 3½ feet a second. Therefore, adequate sanitary ventilation must depend on means other than normally induced air flow. The efficiency of a ventilating system is ordinarily based on the balance between micro-organisms removed by ventilation and those introduced during the same time by occupants of the space concerned. The economics of air conditioning demand that 50 to 90 per cent of the air be recirculated after making adjustments for temperature and humidity.

Thirty cubic feet of fresh air a minute for each person, or the "make-up" air in the most efficient heating and ventilating systems, provides approximately six air changes an hour or one change every ten minutes. This degree of ventilation dilutes the air contamination at such a rate as to require a full hour for practically complete disinfection of a recently vacated room.

It is believed that, for the prevention of the spread of respiratory diseases by air-borne bacteria and viruses, an air purity equal to that of summer living conditions (60 to 120 air changes an hour) must be provided. Figure 1 illustrates the decontamination and disinfection effectiveness of air changes and air change equivalents to the hour.

The installation of the Hygeaire system has made practicable air-change equivalents of 100 to 500 an hour, which is considered to be excellent sanitary ventilation. Micro-organisms, ejected in droplets and suspended in the air are destroyed by this means at a rate far greater than can be accomplished by any known method of mechanical ventilation. The practical results of the Hygeaire system of sanitary ventilation can be measured directly by determining the bacterial content of the air from the irradiated space.

FIGURE 2.—The complete Hygeaire assembly consists of a specially designed reflector, reflector housing, bactericidal lamp, baffle, conductor cord, and plug. The fixed baffle is one of the special features of the Hygeaire, serving to protect the eyes and skin of occupants in the irradiated space against a possible conjunctivitis or erythema by confining the direct beam to the room area above the line of vision. The reflector housing is designed to insure a permanent control on the reflector, to provide a mounting for the baffle, and to permit exposed surface or recessed mounting. Stock reflector housings are available in white or cream white.

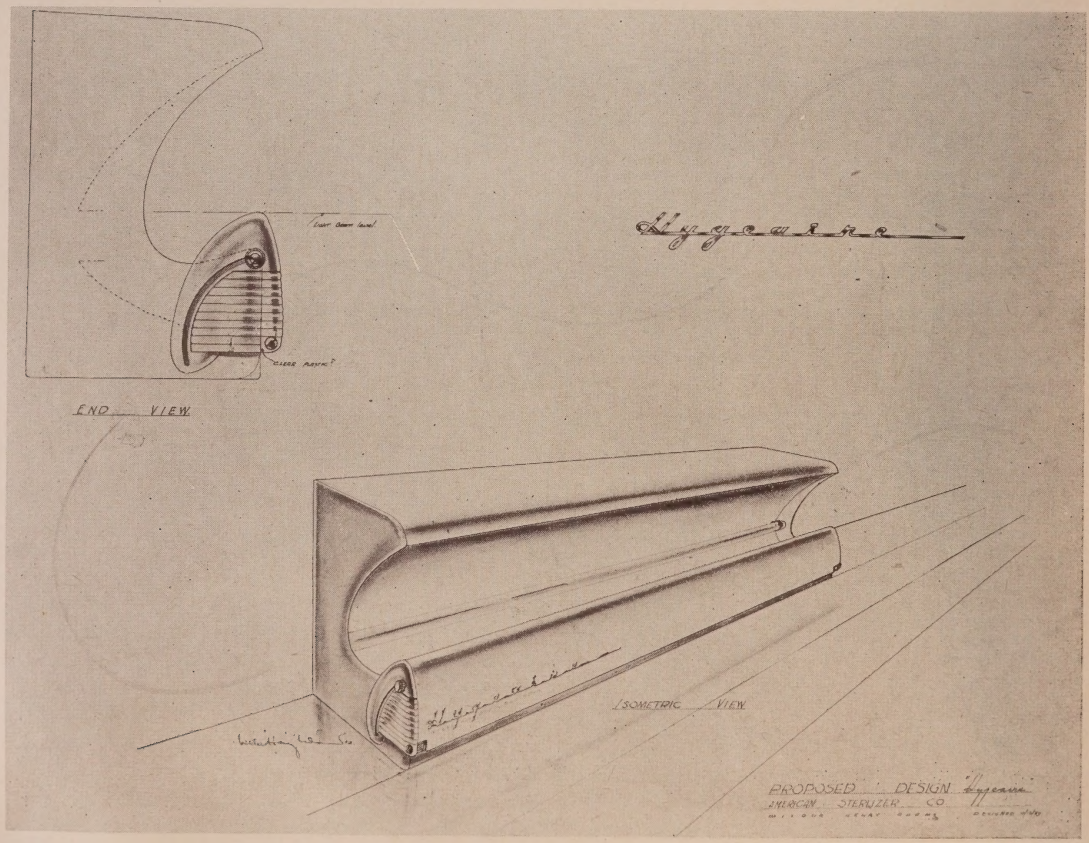


TABLE 1—Specifications and Ratings of the Hygeaire assemblies, Model HUVM-30 and Model HUVM-15.

	Model HUVM-30	Model HUVM-15
Input of germicidal tube and ballast	40 watts	20 watts
Germicidal UV energy output	7.2 watts	2.9 watts
Bacteria (at one foot from tube)—time to effect 99 per cent kill	4-5 seconds	10-12 seconds
Mold (at one foot from tube)—time to effect 99 per cent kill	4-5 minutes	10-12 minutes
Maximum intensity—(microwatts to the square centimeter at one meter)	80	32
Length	36 inches	18 inches
Width	6 inches	6 inches
Height	9 inches	9 inches
Circuit voltage, a.c.	110-125	110-125

THE HYGEAIRE UNIT

Any equipment (fixtures) designed for use with bactericidal lamps must conform to certain basic fundamentals. Those considered to be of prime importance are (1) adequacy of design to insure safety of occupants of the irradiated space from excessive direct or reflected energy, (2) shape of reflector to allow the maximum possible of 2537-Angstrom energy to reach the surrounding air without reflection, and it should reflect the remaining energy, preferably once only, in such a direction as to insure a maximum possible travel through air before absorption by the surrounding ceiling and the side walls. For the usual ceiling height, this means a design to direct all the germicidal energy from the tube in as nearly a horizontal direction as possible. In addition, safety and over-all efficiency as well as convenience and good appearance are desirable adjuncts in design.

The complete Hygeaire assembly illustrated in Figure 2 consists of a specially designed reflector, reflector housing, bactericidal lamp, baffle, conductor-cord and plug. Specifications and ratings of available models are given in Table 1.

The fixed baffle is one of the special features of Hygeaire. It serves to protect the eyes and skin of occupants in the irradiated space against a possible conjunctivitis or erythema by confining the direct beam to the room area above the line of vision.

The reflector housing is designed to insure a permanent contour on the reflector, to provide a mounting for the baffle and to permit exposed surface or recessed mounting. Stock reflector housings are available in white or cream white.

The Hygeaire requires no fan or forced circulation for effective operation. Thermal air currents, due to window and door seepage and wall and radiator temperatures are sufficient to convey bacteria and infected droplets to within the disinfecting field.

Figure 3 illustrates a specially designed Hygeaire fixture for side wall mounting within the theatre auditorium. The over-all dimensions and characteristics of this special type unit are essentially the same as for the standard Hygeaire fixture shown in figure 2, except that a series of vertical louvres are incorporated in the front of each unit to guard against exposure to the direct radiation at close range. In addition, this louvre principle overcomes the objection of excessive illumination and the distractive effects of the illuminated reflector.

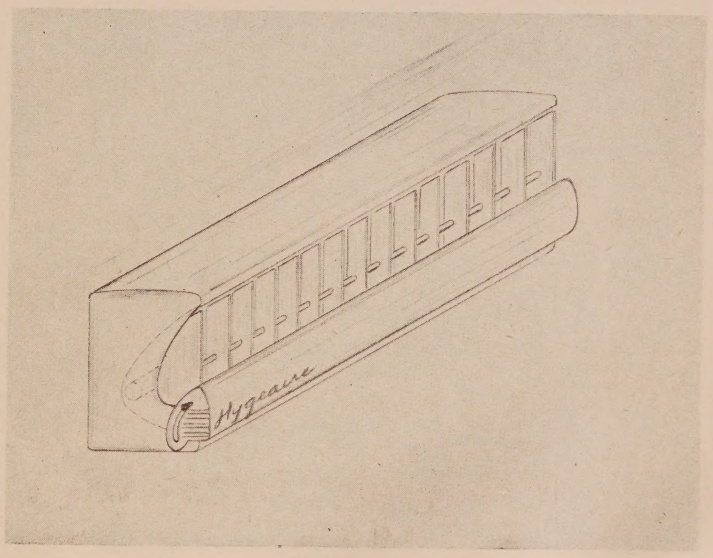
INTENSITY AND DISTRIBUTION OF UV

The air-disinfecting effectiveness of a bare germicidal lamp mounted on the side wall of a room is seriously limited by the fact that about one-half its output of 2537-Angstrom energy is absorbed by the side wall, also a large percentage of the remaining energy is absorbed in the nearby ceiling before this energy has traveled through and disinfected much of the air. Therefore, in appraising the qualities of fixtures designed for the radiant disinfection of air, one must keep in mind that "performance," or over-all efficiency of the unit to direct the energy in the proper direction is of prime importance.

The American Sterilizer Company has satisfied this requirement by designing a specially shaped reflector (comprising a part of U. S. Patents 2,350,664 and 2,350,-665), which redirects the otherwise quickly absorbed energy in a direction of maximum ray length 5 to 15 degrees above the plane of the lamp. This feature increases by 4 to 5 times the intensity of the output from the bactericidal lamp in the most effective direction. The beam of ultraviolet radiation has considerable length but comparatively little vertical spread and consequently the reflector contour prevents little reflecting radiation in the direction below the horizontal. Such stray rays are prevented by intercepting the direct radiation of the tube in a direction below the horizontal by means of the fixed baffle described above.

A typical installation of the Hygeaire system within a theatre auditorium is illustrated in Figure 4. Here it will be observed that six Hygeaire units are required for efficient air disinfection within this space with dimensions of approximately 50 x 100 feet and a ceiling height of 25 feet. The elliptical curves in front of each unit demonstrate the distribution of the ultraviolet energy in watts to the square foot. At the present time, there seems to be agreement among scientific investigators that an intensity of 0.01 watt of 2537-Angstrom energy, uniformly distributed over a square foot area covered with bacteria, or throughout a cubic foot of infected air, will kill 63.2 per cent of the bacteria in one minute; plus 63.2 per cent of the remaining 36.8 per cent (or 86.5 per cent) in two minutes; 95 per cent in three minutes; over 99 per cent in five minutes; 99.9 per cent in seven minutes, and 99.99 per cent in 9 to 10 minutes. Trial installations have shown that it is necessary to mount Hygeaire units on the side walls of the auditorium at a height of approximately 16 feet above the floor. If the fixtures are mounted at a lower level it may be found that the illumination will seriously interfere with good vision to the screen.

FIGURE 3.—An artist's sketch is presented of a specially designed Hygeaire fixture for side-wall mounting within the theatre auditorium. The over-all dimensions and characteristics of this special type unit are essentially the same as for the standard Hygeaire fixture shown in Figure 2, except that a series of vertical louvers are incorporated in the front of each unit to guard against excessive illumination and exposure to the direct radiation.



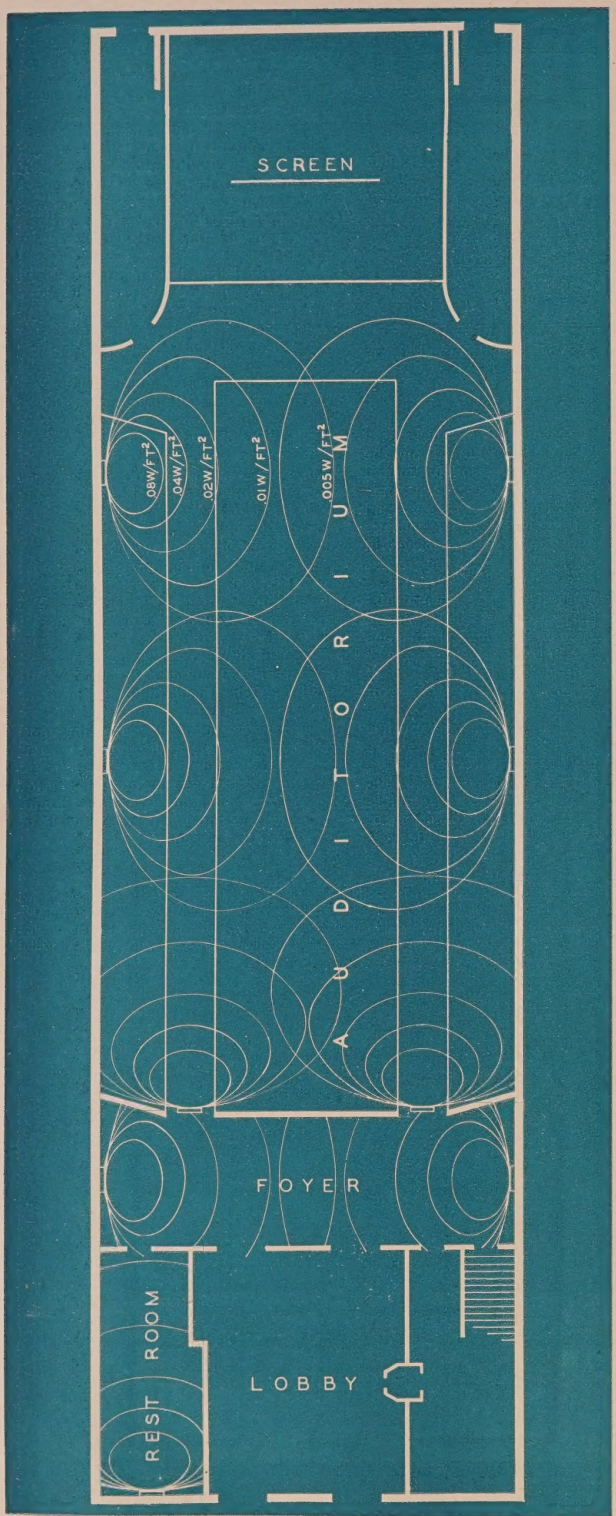


FIGURE 4.—A typical installation of the Hygeaire system within a theatre auditorium is here illustrated. It will be observed that six Hygeaire units are required for efficient air disinfection within this space with dimensions approximately 50 x 100 feet and a ceiling height of 25 feet. The elliptical curves in front of each unit demonstrates the distribution of the ultraviolet energy in watts to the square foot. At the present time, there seems to be agreement among scientific investigators that an intensity of 0.01 watt of 2537—Angstrom energy will kill 63.2 percent of the bacteria in one minute; 86.5 per cent in two minutes; 95 per cent in three minutes; over 99 per cent in five minutes; 99.9 per cent in seven minutes; and 99.99 per cent in nine to ten minutes. (All drawings have been especially prepared for presentation in this article by the attaches of American Sterilizer Company.)

CONTAMINATION OF AIR SUPPLIES

Recent studies have demonstrated that a single sneeze contributes about 100,000 bacteria to the air, the organisms coming from the oral and nasal discharges and traveling at an initial velocity of approximately 150 feet a second. It has been demonstrated that over 4,000 of these bacteria remain suspended in the air for approximately 30 minutes after the sneeze. The simple act of ordinary speech or even the respiratory cycle of an infected person or a carrier of streptococci results in a discharge of organisms into the surrounding atmosphere. If this infected air is then inhaled, the organisms can readily resume their role as disease incitants.

The need for air disinfection within the theatre auditorium is clearly demonstrated by a survey reported in the American Journal of Public Health for August, 1939. The analysis of various air supplies (Table 2) clearly indicates the need for radiation to reduce the number of bacteria and the danger of cross infection.

TABLE 2—Analysis of air supplies, showing the number of bacteria in the air in different situations.

Situation	Number of Tests	Number of Bacteria
Outdoor air, city street	143	112
Outdoor air, city park	13	30
Indoor air, after sneezing	14	3090
Indoor air, theatre	253	72
Indoor air, schools	707	296
Air-conditioned railway cars	16	440

A WORD OF CAUTION

It should be recognized by everyone that the application of ultraviolet radiation for the disinfection of air within the theatre auditorium is still in the experimental stage. The theatre owner or manager should be extremely cautious to observe any exaggerated claims on the part of individuals attempting to promote the sale of equipment. While some very definite and practical information is available at the present time, there still remains much to be done in the accumulation of accurate data as to the efficiency and clinical effectiveness of the installation whether it be in the air conditioning system or directly installed within the theatre auditorium.

Following the installation of the Hygeaire system within the Narrows Theatre, Narrows, Virginia, the management found that they were able to discontinue entirely the use of their regular dim lights and the ultraviolet units gave a very superior light in this respect. In fact, several patrons mentioned that they were able to find their seats much more easily while the show was in progress than was possible by means of the conventional dim lights. The theatre management has conceded that this is an additional advantage.

Patron Protection with Ultraviolet Light

Air-Duct Installation of Germicidal Tubes Described for Sanitizing Air in Theatres

By A. R. DENNINGTON

Sterilamp Specialist (Retired), Lamp Division of the Westinghouse Electric Corporation

About ten years ago Dr. Harvey C. Rentschler, head of Westinghouse Lamp research, became interested in the question of general sanitation of the air. He reasoned that, if food supplies, such as meat, milk, and water, are brought under the supervision of boards of health, resulting in a much better control of epidemics traceable to food, some comparable control ought to be applied to the air we breathe.

The method of air treatment that offered the greatest possibility was by radiation with ultraviolet light known to have bactericidal effects. Very little was known of the various groups of ultraviolet wavelengths or the effects of these groups. In fact, the general impression was that there was only one kind of ultraviolet. Analysis of visible light proves that it is made up of wavelengths representing different colors. In a similar manner, ultraviolet comprises several groups of wavelengths. One group, just shorter than the visible violet (3900 to about 3300 angstroms), is chemically active. It affects photographic plates and, in common with still shorter wavelengths, causes fluorescent and phosphorescent materials to glow. A second group, measuring 3300 to 2850 angstroms, is biologically effective causing tanning, increasing vitamin D, and preventing rickets. The bactericidal wavelengths, 2850 to 2000, reach maximum effectiveness at about 2600 angstroms. Below 2000 angstroms, the wavelengths are rapidly absorbed by the air, especially the oxygen, thus producing ozone.

An electric discharge through mercury vapor at pressures measured by a few microns of mercury produces radiation which is very largely in the bactericidal region. The amount of electric power to produce this group of radiations is small so that it becomes practical and economical to use germicidal ultraviolet radiation for purifying air and thus protecting persons and products from airborne infection. The quantity of radiation required to kill various bacteria and mold spores was determined by an extensive series of tests using phototubes sensitive to different groups of ultraviolet wavelengths to measure the radiation reaching culture plates. The meter used gave an audible click for each unit quantity measured. For simplicity, the units were called "clicks" and, on the standard meter, each is equivalent to 220 microwatt seconds to the square centimeter.

These tests on the scientific fundamentals formed the basis on which the number of Sterilamp ultraviolet lamps is determined for practically all types of installations. The number of and arrangement of Sterilamps specified is based on the scientific facts accumulated over years of research.

Modern air-conditioning systems provide air which is at the proper temperature and humidity and free from dirt. But air in occupied rooms, at times, is highly contaminated with bacteria which may cause respiratory and other diseases.

Adding Sterilamps to air-conditioning systems assures the delivery of air not only at the desired temperature, humidity, and cleanliness, but also virtually free from all disease-producing germs. Properly installed, Sterilamps can attain an efficiency of 98 per cent in the destruction of these disease-producing agencies.

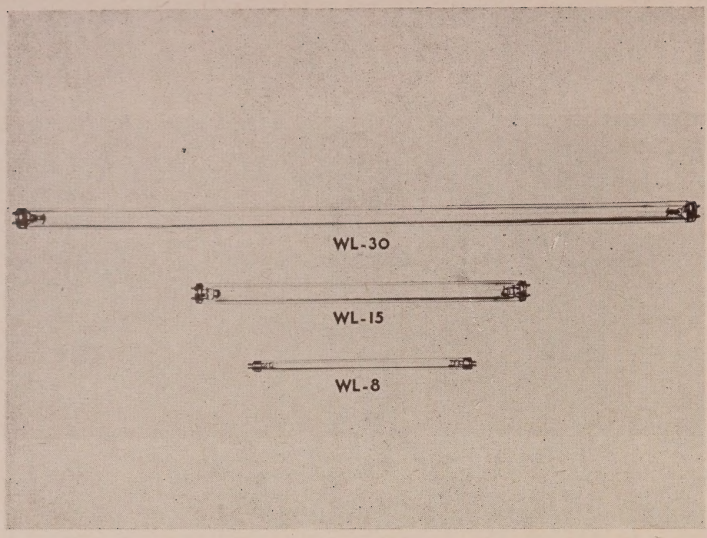
Air-conditioning ducts must be constructed, equipped, and maintained so that there is no chance of damage due to fire and smoke originating within the duct.

Since ordinary glass enclosures around ultraviolet lamps would absorb much of the radiant energy and prevent irradiation of the air, it was necessary to consider the temperatures generated by the lamps. Tests made on 30-inch Sterilamps showed that, at the warmest point directly over an electrode, there was an average temperature of only 156 degrees, with an average temperature over the entire active discharge portion of the tube of 122 degrees, and an ambient temperature of 70 degrees. In view of this, the Underwriters' Laboratories, Inc., under the date of July 28, 1942, made the following statement:

> Inasmuch as these lamps are of the cold-cathode gas-tube type and so have no hot parts to cause ignition in the event of breaking and do not operate at a temperature high enough to ignite combustible materials, it is judged that the installation of Sterilamps in air ducts of air-conditioning systems does not constitute a fire hazard.

Locating Sterilamps in the plenum chamber, where the filtering equipment or the cooling coils are usually housed, should be given the first consideration. When there is an obstructionless length of at least three feet between the filter bank or cooling equipment and the fan opening, maximum efficiency at minimum cost is obtainable with such an installation. The comparatively large cross-section area of the plenum chamber reduces air velocity and makes possible the use of fewer lamps to provide the required amount of radiation. Simi-

INSIDE THE AIR-CONDITIONING DUCT of a large chemical plant, a workman installs for germs a trap—Ster[illegible] lamps. Ultraviolet light from the lamps will kill 98 per cent of the bacteria in the air passing through the duct, thus purifying the air the workers breath and thereby lessening the possibility of contaminating products. The same principles of installing Sterilamps in ducts can be easily applied to theatre air-conditioning systems.



STERILAMPS are long, slender glass tubes made of special glass and operating on the gaseous discharge principle. Pictured here are the common sizes of Sterilamps of the hot-cathode type. Over 80 per cent of the radiant energy given off by Sterilamps is bactericidal. While invisible to the human eye, it kills viruses, bacteria, and molds. For air-duct installation, it is the cold-cathode lamp of comparable characteristics that is usually used.

larly, the dimensions are usually sufficient to house all of the lamps without alteration. Convenience is still another reason for selecting the plenum chamber if possible. It permits easy access for cleaning, testing, and replacement.

The other general location for Sterilamps is in the air ducts, where two possibilities are open. Of these, the delivery duct—between the fan and the first outlet branch—is preferred, since the combined fresh and recirculated air can be sanitized at the same time. Sterilamps can also be housed in the return duct, just before the air passes into the plenum chamber. In this location, the radiation is not directed on the fresh air. However, fresh air approaches the maximum freedom from disease-producing bacteria and it is, therefore, not essential that this air be irradiated.

The proper installatiion of germicidal lamps in air-conditioning ducts requires considerable care. In either duct location, the section should be straight, so that radiation can be effective as the air stream approaches and after it has passed the lamps. Also, the longer the duct the more desirable the location, since, with the more distant spacing the fewer Sterilamps are needed.

Frequently it will be found that the duct is not high or wide enough or has to be otherwise altered because not enough straight section can be found. When an alteration is necessary, care should be taken to allow enough space for the length of the lamp, sockets, and mounting device if any. The minimum length of the transformed duct should be not less than twice the length of the space actually occupied by the lamps, with an equal distance on either side of the lamps. The ends of the altered section should slope into existing ducts gradually, with a 45-degree angle being the maximum that should be used.

The average theatre air-conditioning system can be surveyed in less than an hour. The basic fact to be determined is the number of cubic feet a minute is carried by the system. Usually the owner can provide this information, or it can be secured from the company that installed or that serviced the equipment. Once this figure is known, the number of lamps needed can easily be determined.

Determining the actual number of lamps to be used in any installation has been rendered comparatively simple, through the development by Westinghouse engineers of special charts for different duct systems of various sizes and capacities.

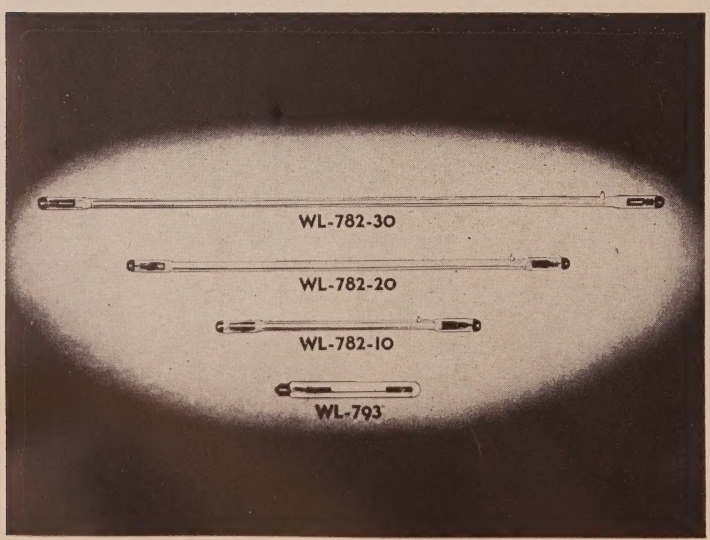
The recommended method of mounting Sterilamps in the plenum chamber of air-conditioning systems in the use of a rack, with the transformer wiring and transformers (connected to series of more than four Sterilamps) secured to the angle irons at one end of the rack. Since the mounting device is of simple design, adaptation to meet special situations would present no problem.

In the duct type of installation, if the width or height of the radiation chamber varies somewhat from multiples of three feet, the electrode receptacles at the center of the chamber may be allowed to overlap. It is possible in this way to adapt the spacing of the inner electrode receptacles to fit lamps. Where the air ducts are only a few inches less than 3 feet, the lamps may pass through holes in the wall of the duct, and the electrode receptacles may be supported on brackets outside the duct. If so, a tight cover must be provided over the receptacles to prevent leakage, as the openings in the side walls must be large enough to permit insertion and removal of the lamps.

While a rack suitable for duct installation may be designed, it is more convenient to place the sockets in holes drilled in the duct walls and mount the Sterilamps in this way. A Z- or U-shaped bracket, attached to the walls of the duct to provide the necessary 36-inch spacing for sockets at opposite ends of a 30-inch Sterilamp, has been found useful where the width and depth measure more than 36 inches.

In order to meet new conditions, the

THE COMPLETE LINE of cold-cathode Sterilamps is pictured here. These lamps, burning at low temperatures, do not add additional load to the air-conditioning system. They operate on the usual 110-volt, 60-cycle, a.c. circuits. The lamps are long lived, being able to be burned continuously for six months, or intermittently for approximately 4,500 hours. The lamp does not burn out, although it does in time lose efficiency, and so it has to be replaced.



Standards of the National Board of Fire Underwriters for the installation of air-conditioning, warm-air-heating, air-cooling, and ventilation systems were modified to read as follows:

> Electrical wiring and equipment shall be installed in accordance with the National Electric Code. Lamps within the enclosure of the conditioning system shall be enclosed in fixtures of the marine (vaportight) type, except that germicidal lamps of a type not using filament, and which operate at relatively low exposed surface temperatures, need not be so enclosed.

The only material, classed as combustible and which may be placed within the air duct in the typical lamp installation, is the insulation on the wires used for connecting the receptacles or sockets supporting the lamps. Normally the current-regulating transformers required are placed outside the duct and only the high tension wires leading to the receptacles are within the enclosure. Where insulated wires are used, they must be Type GTO-5 gas-tube sign cable and run in enclosed raceways as a protection against abrasion and to prevent smoke being carried into the air duct and distributed throughout the theatre if the insulation should become ignited.

Connecting the receptacles with No. 10 A. W. G. bare copper wire eliminates combustible insulation within the air duct and reduces installation costs. The essential insulation is obtained by maintaining a spacing of at least one inch between the wire and any grounded metals. Non-combustible, non-absorptive insulators, such as have been used in neon signs are spaced at intervals of not more than 18 inches and not more than 6 inches from a terminal other than that of an electrode terminal. Ordinarily, electrode terminals, designated Bryant LD-75, are spaced 6 to 15 inches, and so intermediate insulators are not required.

Transformers may be enclosed singly or in groups in metal enclosures, mounted on the top or sides of the air duct. The supports for electric receptacles connected with bare wire may consist of simple L-shaped brackets to give the minimum spacing of one inch between wire and any grounded metal.

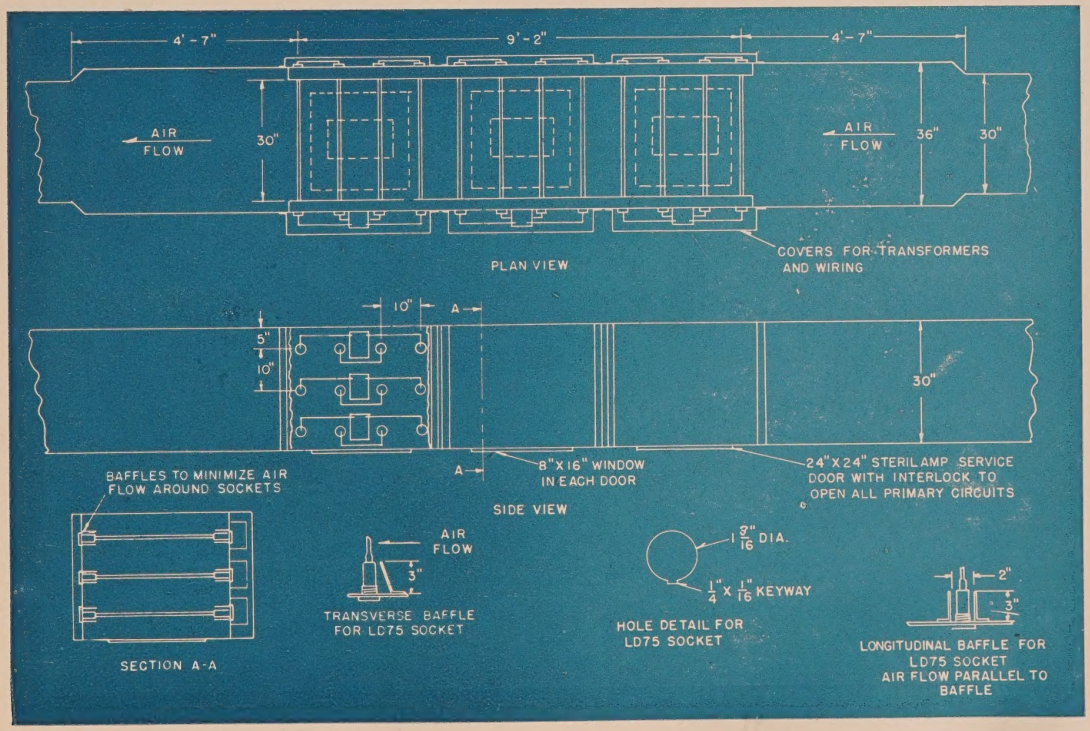
Primary circuits are so arranged that no group of transformers on any one circuit shall require in excess of 15 amperes. As the primary current on a 115-volt circuit required by an ST-90 transformer, operating four 30-inch Sterilamps, is not more than 1.5 amperes, the maximum number of such transformers on a single circuit is ten. It is desirable to keep the number of transformers to the circuits at eight or less, to permit greater flexibility in operating and testing.

In order to see the groups of lamps to determine if they are all in operation, windows of wired glass are provided. As ordinary and wired glass will not transmit ultraviolet radiation, no bactericidal rays escape through the windows. Wired glass is required for mechanical strength and resistance to shattering to prevent the spread of fire if flames are drawn into the duct. The Underwriters specify that no window shall exceed 720 square inches in area. Windows must be fitted air-tight to prevent leakage. If gaskets are used they must be of felt or synthetic material not affected by ozone.

Service doors of sufficient size and number are required to permit reaching and replacing any lamp in a group. As the intensity of ultraviolet radiation is high and since bare conductors may be used in the radiation chamber, it is necessary to provide interlocking switches on the service doors to open the primary circuit supplying the transformers when any service door is opened. Such switches must be listed by the underwriters and have a capacity at least twice that of the current rating of the circuit controlled. These safety features prevent a person, entering the radiation chamber, from being exposed to the high intensity radiation or possible contact with a 3,000-volt wire.

For testing purposes, the circuits may be arranged so that a group of four or eight lamps, operated from one or two transformers, may be put into operation by authorized persons and checked for ultraviolet output.

TYPICAL ARRANGEMENT OF STERILAMPS in a 30x30-inch duct is shown in these sketches. There are 36 30-inch Sterilamps, set on 10-inch centers. In this air-conditioning system the volume of air is listed as 6,250 cubic feet a minute, with a velocity of 1,000 feet a minute. To accommodate the 30-inch Sterilamps, the height of the irradiation chamber has been increased from a diameter of 30 inches to 36 inches. Note should be given to the arrangement of the doors in the ducts that permit easy servicing of the equipment. (All drawings and photographs have been submitted for use by the Westinghouse Electric Corporation's Lamp Division.)



Management Can Beat Its Insect Problem

Last Word in Insecticidal Ways and Means Are Set Forth by Noted Cornell Scientist

By Dr. Harold H. Shepard

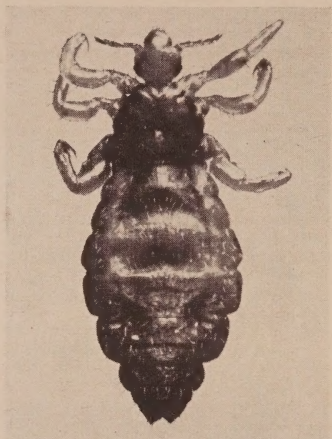
Insect Toxicologist of the New York State College of Agriculture at Cornell University

Human activities with few exceptions are affected in one way or another by the ravages of destructive insects, and the buildings in which we gather for enjoyment of the theatrical arts receive their share of this attention from vermin. Some insect species endanger human health, while others cause heavy financial loss through damage to structure and furnishings of the theatre or to the goodwill of the public. The presence of cockroaches and similar vermin in halls and washrooms is liable to be observed and result in withdrawing customer patronage due to a reputation for unsanitary conditions.

The number of insect species that regularly become destructive around theatre premises is comparatively few and fairly easy to recognize. Many other kinds, however, occur now and then. This increases the problem, but for the most part if certain principles of control are followed, the insects can be eliminated successfully even if their exact species remains undetermined.

The most important factor in avoiding heavy financial losses from insect depredations is the ability of the person in immediate charge of a building to recognize an insect invasion before it gets out of hand and to see that suitable measures are employed for eliminating it. An eye alert to appreciate an incipient infestation can be the means of avoiding the drastic and expensive fumigations and repair jobs that careless or uninformed management is likely to entail. The old adage about an ounce of prevention being worth a big chunk of cure is just as true today—at least, in insect control.

Often if an insect infestation becomes serious the most prudent solution is to employ the services of a pest-control operator (exterminator). Be careful,



THE BODY LOUSE, natural size up to 1/6 inch in length, can be easily controlled on theatre seats by an oil-base contact spray or a 10 per cent DDT dust. (U. S. Department of Agriculture, BEPQ, photograph.)

however, to select an operator with an established reputation for reliability. Sometimes it is an economical arrangement to contract for the regular protective services of the operator. Unfortunately, smaller towns are frequently without exterminator services and too distant from them reasonably to expect an operator to answer their calls. Then it becomes more than ever necessary for the local manager to "know his bugs," and to direct their control himself.

INSECTS VS. HEALTH AND COMFORT

Where large numbers of people frequently assemble indoors vermin such as lice and bedbugs are liable to be introduced.

Lice normally remain in a person's clothing where they can enjoy the pleasant climatic conditions provided by the body warmth of the human host. They only accidentally become dislodged and then crawl around, for instance, in a theatre seat. Lice cannot breed separated from the warmth of their human hosts.

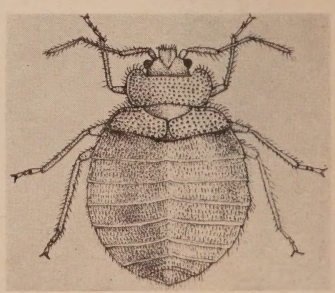
Bedbugs, on the other hand, are not so likely to be carried on the person, but once they become established in cracks in theatre seats they can gorge themselves with blood during show-time and in a few weeks develop new generations amidst steadily replenished food supplies. Bedbugs may also be introduced in a building in second-hand furniture, baggage, and laundry.

Human Lice

Human lice are wingless, sucking insects with three stages of development: egg, immature form, and adult. The eggs, called "nits," are attached to hairs of a person's head or laid in the seams of his underclothes. The young, immature lice are similar to the adult, but smaller and lighter-colored. The mature louse is light gray, moves rapidly, and becomes as large as one-sixth inch in length. The life cycle, from the time of laying the egg until the next generation becomes mature, averages 16 days for the body louse. Unfed adults live as long as 7 days at about 63 degrees Fahrenheit; if fed, they may live up to 46 days. Infested garments or other fabrics, kept at ordinary room temperatures, will be entirely free of living lice and nits if no access to a meal of blood is allowed for a period of 30 days. Liberal and thorough applications of an oil-base contact insecticide or a 10 per cent DDT dust will control human lice on theatre seats. A general building fumigation will kill all stages, but should not be necessary.

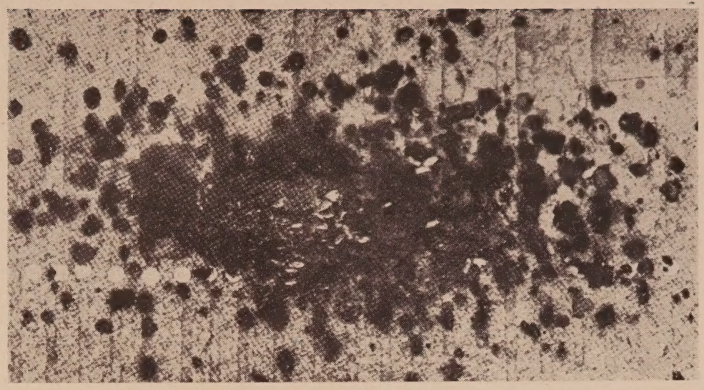
Bedbugs

Bedbugs are also wingless, sucking insects with three stages of development. They, however, are brown in color with a broadly rounded, flat body. When crushed they give off a characteristic "buggy" odor. Although they feed principally upon the blood of man, they sometimes attack such animals as pigeons, sparrows, and squirrels which may infest a building. It only requires 3 to 5 minutes for a bedbug to obtain a full meal of blood and then the bug



BEDBUGS are sucking insects, feeding for the most part on the blood of man. Right is a bedbug before, and at the left after, enlargement. It requires from three to five minutes for these little suckers to get their fill, and then they crawl off for several day's recuperation from the gory binge. Bedbugs are controllable by much the same methods as for lice. Since bedbugs crawl some distance from their source of food, control measures must be more intense. (U. S. Department of Agriculture, BEPQ, photographs.)

crawls away to its hiding place for a period of several days before feeding again. Hiding places can often be confirmed by the presence of clusters of small dark spots resembling over-size fly specks. These spots are the excreted wastes from digestion of blood meals. Feeding is normally in the dark, but when the bugs are extra hungry it may occur in broad daylight. Eggs are seldom laid at temperatures below 60° Fahrenheit. In heated buildings the life cycle requires 6 to 8 weeks. Under rather cool conditions (60 to 65 degrees) young bedbugs may live nine months with only a single feeding. Control measures are much the same as for lice except that bedbugs crawl to hiding places some distance from their source of food and lice remain near where they were dislodged. Bedbugs become a problem in dressing rooms and rest rooms, as well as around auditorium seats. DDT (either a 5 per cent spray in hydrocarbon-base oil or a 10 per cent dust) will clean up bedbugs and prevent reinfestation for over six months.



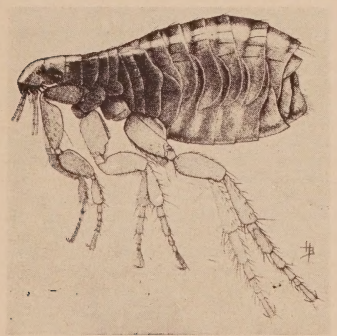
SPOTS CHARACTERISTIC OF BEDBUG HIDING PLACES are shown here. The spots resemble over-size flyspecks and are the excreted wastes from the digestion of meals on blood. While bedbugs normally feed in the dark, they will, when extra hungry, feed in broad daylight. Bedbugs sometimes become a problem in dressing rooms and rest rooms, as well as around auditoriums. DDT is a control. (U. S. Department of Agriculture, BEPQ, photo.)

Fleas

Fleas are extremely important from the health standpoint because they transmit typhus in the southeastern United States and plague in the West. Wherever fleas are found in the United States control should be primarily by elimination of animal hosts, which are usually cats, dogs, rats, mice, or squirrels. No such animals should be allowed around premises where the public is to be served, whether food or theatrical art. No matter how clean they are kept, if they are allowed the slightest freedom, cats and dogs will carry fleas. The other animals mentioned are themselves destructive, and for that reason alone, even if public health were not at stake, their presence should not be countenanced. They can be eradicated by means of poison baits, traps, or fumigation.

Fleas are tiny, wingless, hard-shelled jumping insects which annoy people by biting them, particularly about the ankles. Fleas, in order to breed, must have blood to feed upon. The adult flea lays its eggs in the fur of the host but these eggs drop off in the animal's bed or in cracks in floors and furniture frequented by the animal. In a few days, worm-like larvae hatch and feed upon organic matter. In 2 or 3 weeks, they form cocoons and change to adult fleas again. Because fleas may develop for a month or two after the host animals have been eliminated, it is necessary to apply insecticides against the insects themselves, especially in places where the host animal has been in the habit of sleeping and running. Because adult fleas can only jump a little over a foot off the floor at the most, floors and upholstered furniture are the only locations that require treatment for flea control. DDT in either a liquid spray or a dust appears to be superior to all the older insecticides for flea control, primarily because this chemical exerts a residual action and kills the insects which hatch after application.

THE CAT FLEA, in common with other types of fleas, is particularly important to health because it can transmit, in its feeding, various diseases, including typhus and plague. (U. S. D. A., BEPQ, photograph.)



Mosquitoes and Flies

Mosquitoes and flies in their adult stage transmit a number of human diseases, notably malaria in the case of the anopheline mosquitoes. Since theatre management seldom has control over those areas outdoors where these insects breed, the elimination of breeding places will not be discussed here. The immediate problem is chiefly two-fold: first, screening (16 meshes to the inch) to keep the flying adults from coming indoors and, second, destruction with insecticides of those that succeed in entering. Until the present time, fly and mosquito extermination indoors could best be accomplished only with direct contact sprays of the "flit" type, containing for the most part pyrethum, Lethanes 384 and 384 Special, or Thanite as the toxicant. Now, although the latter are still important for supplemental spraying, the basic treatment should be a residual contact spray of DDT applied to interior walls where flies and mosquitoes come to rest sufficiently long for the DDT deposit to take effect through their legs. Fly traps should not be used because the bait in the trap attracts flies without catching them all. Sticky fly paper is unsightly and so inferior in results that its use is mostly wasted effort. Electrical fly screens kill many flies but they are expensive to install, the burned flies have a foul odor and control is not satisfactory.

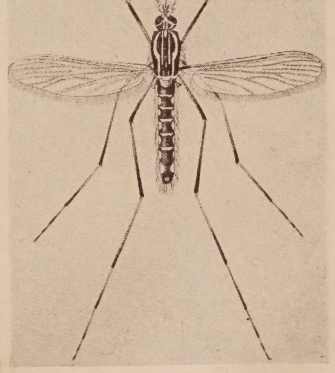
Blowflies

Blowflies are large, noisy, shiny flies, bluish, greenish or black in color. They develop in the flesh of dead animals. A temporary nuisance may be occasioned by the body of a squirrel or rat in a ventilator shaft or similar location from which white maggots migrate into view and transform into these obnoxious flies.

INSECTS DESTRUCTIVE TO FABRICS

Clothes moths and carpet beetles breed in furnishings, wardrobes, and costume materials made of stuff of animal origin, such as wool, feathers, hair and furs. Silks are sometimes injured by carpet beetles, rayon by silver-fish. Clothes moths spin a silken webbing where they

THE YELLOW-FEVER MOSQUITO and that which transmits malaria should be known to theatremen, that they may promote (if only for selfish reasons) the highest level of health. (Cornell University drawing.)



THE BLOWFLY, large, noisy, and of shiny blue, green, or black, usually develops in carrion. It can be controlled in much the same manner as house flies, and, of course, should be. (Cornell University drawing.)

feed, whereas carpet beetles and silverfish do not spin silk. The latter two pests do most of their damage to material accessible from the floor or packed in drawers and trunks or on shelves. Clothes moths are just as likely to infest fabrics hanging up as anywhere else.

Webbing Clothes Moths

Of the three species of moths which infest fabrics the webbing clothes moth is the most generally destructive. The adult moth is only about one-fourth inch in size and pale cream-colored without spots or other markings. It flies into dark places behind furniture or runs hurriedly into folds of clothing when disturbed; it does not fly about lights. The four stages of the clothes moth are the egg, larva, pupa, and adult. The eggs are tiny, white and seldom seen. The larva is the "worm" or feeding stage, a small white caterpillar half an inch long or more when full grown. Wherever the worms travel, they spin silk threads in the form of tubes into which they withdraw for protection. The silken tunnels and webbing are conspicuous signs of the presence of clothes moths, as are also the tiny hard pellets of excrement left by the worms and often assumed to be eggs. The pupa is the stage during which occurs the transformation of the "worm" to the moth. At average summer temperatures of 70 to 80 degrees with liberal food supplies the insect's life cycle lasts 65 to 90 days. The adult moth lives only one to two weeks, long enough to lay 100 to 150 eggs. The moth does not feed because it has no mouth; its importance lies in its capacity to lay eggs. Clothes moths develop in woolen clothing; in furniture filled with hair or upholstered with woolen fabrics such as mohair; in woolen lint and animal hair collected in cracks of floors and in vacuum cleaners; in hot and cold air shafts from a furnace; in tapestries, carpets and rugs; in hair brushes and feather dusters; in stuffed animals and birds and their skins and feathers; in felt hats and piano felts; and in hair or wool used in insulation and deadening felts. Cotton, linen, and silk are not used as food but may be cut through by the larvae to reach animal fibers or to provide cocoon material.

Carpet Beetles

Carpet beetles pass through the same four stages as clothes moths except that the adult is a beetle instead of a moth. Although several species of carpet beetles are destructive in the United States, only two of the most common ones will be described here, the black carpet beetle and the buffalo carpet beetle. All are controlled by the same methods. Carpet beetles do not spin silk; but signs of their presence are the dead beetles and cast larval skins. The beetles are attracted to sunlight at windows.

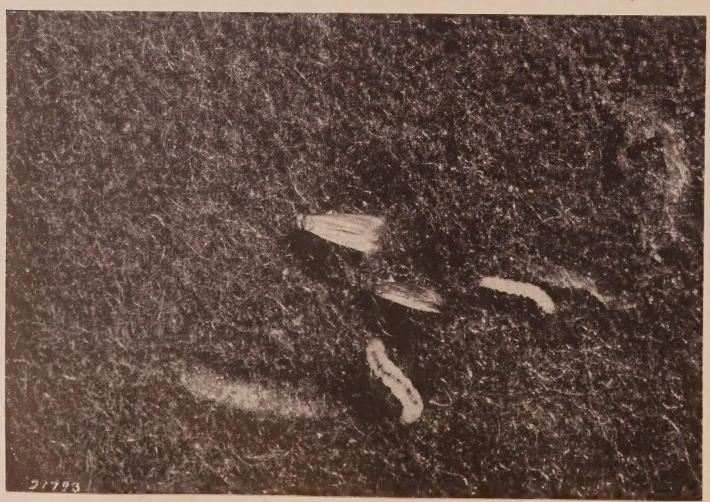
THE COMMON HOUSEFLY, more than being an obnoxious pest, is a carrier of disease and, accordingly, should be an avowed enemy in a continuing war. While more nuisancesome in places other than theatres, it is still a pest there, and besides being very annoying to patrons looking at the show, flies frequent other portions of the theatre with greater regularity. Toilets are a favorite hang-out for houseflies.

The black carpet beetle in its adult stage is a shiny, oval, plain black beetle. Although it varies in size, it is usually about one-eighth inch long. The adults live from two weeks to a month while they lay their fragile, white eggs, possibly over a hundred in number. The larva is brown and covered with short, stiff, brown hairs which lie flat and are directed toward the rear end of the body. It is slender and progressively smaller toward the rear, where a conspicuous tuft of long bristles is located. In this stage the skin is shed several times, the discarded skins often being found at the point of infestation when the actual insects are not to be seen. The larva, or feeding stage, requires several months to over a year to develop, depending on temperature and the type of food available.

The buffalo carpet beetle is frequently known as the "buffalo bug," or, less appropriately, the "buffalo moth." The adult beetle, usually smaller and proportionately broader than the black carpet beetle, is black spotted with white and has a bright red line down the center of the back. The larva is shiny brown or blackish and so covered with upright tufts of black hairs that it looks like a little black brush. It is much shorter and stouter than the larva of the black carpet beetle.

The protection of articles susceptible to clothes-moth and carpet-beetle injury involves a combination of precautions and procedures depending upon circumstances. While in frequent use, things are not liable to damage, but when put away for a month or more they should be protected. Tight boxes and garment bags which can be sealed to prevent the entry of insects will keep items in their original condition, provided the latter were clean and free from infestation when put away. Steps which may be taken to insure freedom from insects before storage are to brush thoroughly, shake vigorously, launder, dry clean, or fumigate. Cold storage facilities (at between 40 and 50 degrees) when available can be utilized to provide additional insurance against insect damage. The temperatures are not low enough to kill the insects but suffi-

CLOTHES MOTHS, with larvae ("worms") and webbing, are seen on a woolen blanket. It is the larva, a small, white caterpillar about a half-inch when full grown, that "eats holes." Besides the holes, the silken tunnels and the webbing are conspicuous signs of the presence of these. While moths do not utilize plant fibers as food, they sometimes will cut through these materials to reach underlying animal fibres. (University of Minnesota photo.)



ciently so to chill them into inactivity and to prevent new infestation from outside. Frequently in the northern United States some moderately cool space is available for storage purposes in the building. Moth crystals (either paradichlorobenzene or naphthalene) should be sprinkled liberally in storage boxes and bags. The fumes of these chemicals will keep moths from breeding sometimes for several months if the container is fairly airtight. Dispose of worthless articles promptly because such things frequently become the source of a bad general infestation.

Insects damage upholstered furnishings by injuring the cover or by feeding within the stuffing. Cover injury is usually the result of external surface feeding but it may be due to feeding from within. Frequent and thorough brushing and vacuum cleaning not only remove clothes-moth eggs, worms, and webbing from the back and seat but also carpet beetle larvae from the cracks around the cushion. Spraying thoroughly until the surface is uniformly damp with an oil-base moth spray will kill insects in the cover. If the spray contains 5 per cent DDT, the cover will be protected from re-infestation for several weeks or months, depending upon thoroughness of application, light conditions, and a variety of other factors. If worms and the debris from their feeding begin to sift on to the floor underneath upholstered furniture, the stuffing is probably infested. The furniture should then be fumigated, a job best done by a professional fumigator.

Most insect injury to rugs and carpets is by carpet beetles. Clothes moths generally work on rugs only in dark places under furniture that is seldom moved or in unprotected rugs rolled up in storage. Carpet beetles develop slowly and injury by them is gradual unless the insects are extremely numerous. For these reasons it is usually easy to prevent appreciable rug injury. In fact, carpet beetles are often so well controlled by the usual cleaning routine that their presence is seldom suspected. Where carpets are fastened down and not often taken up, beetle injury may become serious, the beetles being able to remain relatively undisturbed for long periods in a single place. Infested rugs may be sent to a cleaner or fumigator, but fumigation merely rids them of insects and does not prevent reinfestation immediately after the rugs are laid down again in an infested building. This is also true of fumigated furniture. Valuable rugs may be moth-proofed to prevent injury. Results depend upon the poison used and the thoroughness of application. The fabric must be wet through or untreated spots will be left where the insects are likely to congregate. The ordinary person is not equipped to moth-proof furniture and heavy rugs. Furthermore errors are costly. An experienced and reputable firm will back up its work and insure satisfactory performance.

BUFFALO CARPET BEETLE and cast larval skins are shown in this picture. This insect, frequently known as the "buffalo bug" or (less appropriately) "buffalo moth," is usually smaller and proportionately broader than the black carpet beetle. Because carpet beetles develop slowly, they are generally controlled by the usual cleaning routine. Where carpets are not often taken up, injury may be serious. (University of Minnesota photograph.)

INSECTS DESTRUCTIVE TO WOODWORK

Termites

Termites, sometimes called "white ants," are the most destructive of all wood-consuming insects. Although injurious sometimes as far north as New England and the North Central States, they cause more serious damage to wooden structures in the South. Practically all this damage is done by the subterranean type of termite, which nests in the ground with tunnels extending into the wooden parts of buildings sometimes long distances above ground. These insects cannot live cut off from the moisture of the soil. Their only means of travel from the soil to their sources of cellulose for food are in the tunnels which they construct. Usually termites enter a building where the wooden structure comes in contact with the ground, for instance, by way of wooden steps, basement window frames, or lattice work. They may also enter through cracks in the foundation or basement walls, especially in dark, damp places under sheds and loading platforms. Because termites feed within the wood they may cause considerable damage before their presence is discovered. The first indication of damage may be broken steps or a sagging floor. Because the layman often cannot be certain if termites are responsible for structural injury or failure, a reliable pest control operator who

BLACK CARPET BEETLES, with larvae and cast skins, are shown here. The control measures for both the black and the buffalo carpet beetles are the same. Where theatre carpets are concerned, the employment of competent, reliable exterminators is recommended. (University of Minnesota photograph.) All illustrations in this article have been used through the good offices of Dr. H. H. Shepard, with caption credits to the originating agency.

is familiar with this type of damage should be consulted. In areas of the South where termites are commonly destructive the manager should make periodic inspections of the foundations of buildings (once or twice a year) for evidence of termites. Earthen tunnels on basement and foundation walls and wood weakened by tunneling near or in contact with soil are signs of these insects. Suspicious evidence should then be brought to the attention of a pest control operator. Termite damage is relatively slow and may go on for several years before extensive repairs are necessary, particularly in the northern United States. Because "termite control" forms a considerable racket in the hands of unscrupulous persons great care must be taken to obtain reputable advice concerning these pests.

A subterranean termite colony consists of three forms or castes of adult insects: workers, soldiers, and reproductives. The workers and soldiers are wingless and creamy-white in color, similar in shape except for the large heads and jaws of the soldiers. The reproductives have wings when they first become mature. These winged termites swarm out of the nest and seek new nesting locations where they shed their wings. It is the workers which tunnel in wood to perform their task of feeding the colony located in the soil.

Other pests destructive to wood are powder-post beetles and species with similar habits which lay their eggs in the pores of unfinished flooring, and other lumber stock. The mature insects emerge through exit holes a year or two later. Infestation usually takes place when the lumber is being seasoned, damage in the case of some common species being confined to the sapwood of coarse-textured hardwoods such as oak. Often by the time an infestation is discovered the damage has been done because adult emergence holes usually constitute the first evidence of injury. The holes are round and about 1/16 inch in diameter. Sometimes, however, siftings of fine sawdust-like borings indicate the work of powder-post beetles. Treatment of flooring or other infested woodwork with a solution of 3 to 5 per cent pentachlorophenol (Dowicide G, Permasan, and the like), in fuel oil or kerosene will kill unemerged insects and prevent further infestation. This mixture can be obtained ready prepared under a number of trade names, such as Permatox A. The insects cannot lay their eggs in wooden surfaces which have been treated with varnish or other finishing materials which fill the surface pores. If they emerge through such finished surfaces the wood must have been infested prior to finishing.

THE AMERICAN COCKROACH primarily frequents those locations in a building where warmth and moisture are available, particularly in dark places. They like starches. (Cornell University photograph.)

TERMITE SHELTER TUBES are seen constructed up a foundation wall in a poorly ventilated, basementless area beneath a building. Termites, sometimes called "white ants," are the most destructive of all wood-consuming insects. Since it is often virtually impossible for a layman to tell whether or not termites are doing any damage, services of a reliable pest-control operator should be engaged. (U. S. Department of Agriculture, BEPQ, photo.)

MISCELLANEOUS INSECT PESTS

Cockroaches

Cockroaches frequent primarily those locations in a building where warmth and moisture are available, particularly in dark places, as around leaky steam-pipe joints in the basement or in washrooms. Cockroaches may pass to and fro from favorable feeding conditions in a nearby grocery store or restaurant to favorable hiding places in the theatre. In the South, cockroaches run freely from building to building. Where more desirable food is scarce, cockroaches will devour the starch and gums utilized for bookbindings, for sizing fabrics, for outdoor billposting and for finishing the surface of paper and cardboard.

Several kinds of cockroaches are common, the American and oriental cockroaches being large dark-colored species from 1¼ to 2 inches long when full grown, the lighter brown German cockroach less than ¾ inch long. All are rather flat, active insects and have long antennae. They feed at night and scurry rapidly out of sight when surprised by the sudden turning on of lights. Cockroaches often hide in crevices behind sinks, water and steam pipes, and similar locations from whence they can be driven in surprisingly large numbers by forcing roach powder into those places. The most efficient treatment for cockroaches is the thorough dusting of all hiding places with sodium fluoride, or a mixture containing both sodium fluoride and pyrethrum. DDT has been found to be no better than sodium fluoride. Lethane A-70, new within the past two years, is being used extensively in commercial cockroach powders, but may not give as good service as either the sodium fluoride-pyrethrum mixture or 10 per cent DDT dust. Phosphorus paste is effective against the larger species of cockroaches but not against the smaller German cockroach. Borax, an old-time "remedy" for cockroaches, is of very low efficiency.

Silverfish and Fire Brats

Silverfish and fire brats are wingless, scaly insects, their bodies tapered and bearing three bristles at the hind end. Silverfish, as suggested by the name, are like polished silver in color, feed upon glue and starch sizing in books, wallpaper, rayon, and starched goods. They hide in cracks in damp cool places and run rapidly when disturbed. Fire brats differ in being a mottled gray, yellow and white, and in living in hot places around steam pipes and furnaces. Control of these insects can be accomplished with DDT dusts or sprays.

INSECT CONTROL IN GENERAL

Insect control is a many-sided subject. It may be directed chiefly toward extermination of insect infestations already established or the prevention of infesta-

tions may be emphasized. Structural planning prior to construction, cleanliness not merely in the ordinary sense but with the prevention of insect development in mind, the provision of cool, dry storage facilities—these and other factors are of tremendous concern in terms of dollars and cents.

Structural Planning

With but little extra expense at the time of construction a building can be made reasonably termite resistant. Metal termite shields installed properly, use of lumber which has been pressure treated with a suitable wood preservative wherever wood must be placed in contact with the soil or within a few inches of the ground surface, are important measures in this direction. Because termites favor moist ground and damp wood in which to work, a well-drained location should be chosen. Cross-ventilation beneath all parts of a structure will aid greatly in keeping both soil and wood in a dry condition, and unattractive to termites. Building specifications for termite control should conform to the recommendations of the United States Bureau of Entomology and Plant Quarantine.

At the same time that termite-proofing is considered, thought should be given to rat-proofing. Detailed directions are presented in Conservation Bulletin 19 by the U. S. Fish and Wildlife Service, Washington 25, D. C.

Carpet beetles and fleas breed in lint and other debris in floor cracks. Therefore, wooden floors should be as free from wide cracks as possible.

Cockroaches prefer narrow crevices near sources of water in which to hide. They like to feel their roof snug against their backs! Buildings can and should be constructed to eliminate favorable hiding places for roaches. Sinks installed so as to leave a space of 2 inches behind them do not harbor many roaches.

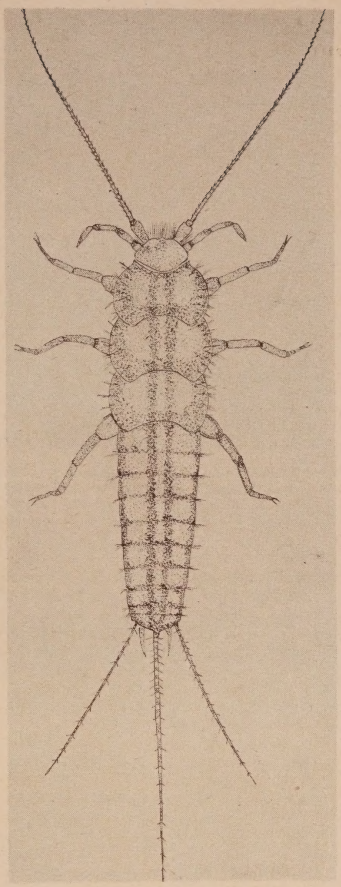
Cleanliness

Cleanliness is important in insect control. Certain details of the cleaning routine in one establishment may be responsible for keeping down insects that become annoying in another place, although the latter appear superficially to be just as clean. Often the little things about cleaning, such as attention to out-of-the-way corners, count most in insect control when practiced day after day or month after month. Regular and intelligent inspections of the condition of building and furnishings should be made at least once a month.

Thorough cleaning of furniture by vacuum with particular attention to deep crevices behind cushions and between seat and back will remove both eggs and insects. Waste materials and worn-out articles should be disposed of promptly to avoid providing unnecessary breeding places.

INSECTICIDES

The use of insecticides, contrary to the common attitude, should be regarded in general as supplementary to preventive measures. Insecticides are to be applied with care because most of them are poisonous, at least to a certain degree; moreover, they may have a deleterious effect upon interior finish and furnishings.



THE COMMON SILVERFISH feeds on such things as glue and the starch in sizing, wallpaper, and starched goods. He is also fond of rayon. DDT sprays and dusts are good controls. (Cornell University drawing.)

DDT

DDT, short for dichlorodiphenyltrichloroethane, is that new wonder material put into practical application in the United States first for protection of our armed forces against louse-borne typhus fever. So much publicity has been given to DDT that the erroneous belief may become general that this compound is a panacea to use against any insect life and that it will supplant all insecticides previously recommended. Remember, however, that:

(1) DDT must be properly compounded commercially as a spray or dust before it can be utilized as an insecticide. DDT is not soluble in water and the crystals cannot be ground fine enough for dusting purposes with the usual equipment.

(2) DDT will not kill some kinds of insects any better or even as well as other insecticides we already have.

(3) DDT must be applied carefully according to directions or results will not be any more satisfactory than with other insecticides.

For spray purposes DDT is recommended at 5 per cent in a hydrocarbon base oil of the kerosene type. For dusting, it is recommended at 10 per cent, usually in pyrophyllite (Pyrax) as the diluent. DDT appears to be particularly effective against flies, mosquitoes, bedbugs, lice, fleas and clothes moths. The most outstanding advantage in its use is its residual action, "proofing" areas or articles against re-infestation in some cases for over six months. Thorough application of DDT spray to fabrics such as rugs and carpets will "mothproof" them for awhile. DDT liquid sprayed liberally onto interior walls, theatre seats, etc., will eliminate flies, mosquitoes (except those just flown in and not yet exposed to the DDT), bedbugs, lice and silverfish.

DDT must be regarded as poisonous although it is not as dangerous in this respect as many insecticides already in common use. Like all insecticides, however, it should be handled carefully. It is believed that only the oil-base DDT spray will penetrate the human skin. If any considerable quantity of the liquid is to be handled, rubber gloves should be worn and the hands later washed thoroughly with soap and water. Brief wetting of the hands with the oil-base insecticide will cause no ill effects.

Although DDT dust can be used against cockroaches the different species vary in their susceptibility to this insecticide.

Sodium Fluoride

Sodium fluoride or a mixture of pyrethrum and sodium fluoride, long standard cockroach powders, appear to be as reliable, perhaps more so, than DDT. Sodium fluoride is poisonous to man if taken internally in sufficient amounts but if used carefully in roach control no harm will follow. If much is to be applied, however, irritation of the nose and throat should be avoided by wearing a dust mask or several thicknesses of cheesecloth over the nose and mouth. The powder should be applied with a mechanical duster with which the insecticide can be forced deep into crevices behind pipes and sinks, or wherever else cockroaches are observed to hide. The idea is to hit as many roaches as possible directly so they will die immediately (within an hour or so). Those not so hit will have to run through the powder a considerable distance to be affected. It is best to apply the powder in the evening and not to clean it up for 2 to 4 days. Repeat the application each week or two until all cockroaches disappear. The advantage of the mixture of sodium fluoride with pyrethrum is that the latter ingredient excites the insects and makes them run through the sodium fluoride.

Gammexane

A promising new insecticide is benzene hexachloride, a British development under the name of Gammexane or 666, but little is yet known regarding its practical possibilities. Contrary to the early claims made for its superior qualities, however, it is not as effective as DDT against some important agricultural pests. No reliable information is yet available re-

garding its effect upon pests of buildings.

Pyrethrum

Pyrethrum is utilized either as the ground dried flowers of the pyrethrum plant imported from Africa or South America, or as sprays containing an extract from the flowers. Pyrethrum dusts made by absorbing the extract in talc or a similar carrier are said to be more effective than the ground flowers themselves because the effective agent is present on the exterior of each dust particle instead of being dispersed within the particle where it cannot come in contact with the insect. Pyrethrum is most important for its excitant qualities when added to sodium fluoride and other killing agents. When used alone the effects of pyrethrum often wear off so that the insects recover. Pyrethrum is not poisonous to higher animals and man, although it does affect persons who have ragweed hay-fever.

Rotenone

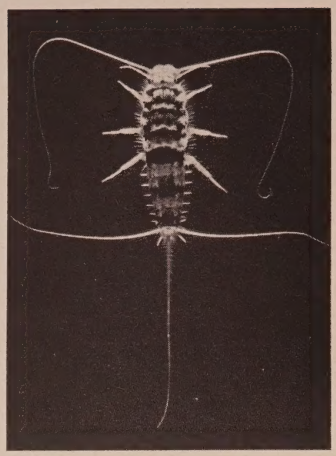
Rotenone is the insecticidal principle present in derris roots from Malay and Java and in cube and timbo roots from the Amazon region. Rotenone dusts are excellent for treating pet dogs and cats to control fleas and lice. They have not become popular generally with pest control operators, probably because rotenone is slow in its action. They are, however, effective against cockroaches and many other household pests, and such insects do not recover from the effects of rotenone. This insecticide has the advantage that it is non-poisonous in anything but massive amounts.

Insect-Proofing

Insofar as possible, fabrics, such as carpets, upholstering, and tapestries susceptible to insect injury, should be made moth-resistant (often referred to as "moth-proof") to protect against clothes moths and carpet beetles. The preparations used commonly are water solutions of fluosilicates. Arsenicals are less effective, less resistant to cleaning, and more dangerous to health. Oil solutions containing such insecticides as DDT are said to have some value. Some fabrics intended for upholstering are made moth resistant during manufacture. "Moth-proofing" solutions are not designed for killing insects by direct contact, but to make the fabric unappetizing or poisonous to moth and beetle larvae. The degree of effectiveness and permanency is dependent upon the thoroughness of application. It pays to have valuable furnishings made moth resistant by a commercial operator with proper high-pressure spray equipment.

Fumigation

Fumigation is the treatment of a closed space (box, room, or entire building) with a poisonous gas. On a large enough scale to kill insects in an entire room or building it is dangerous to the person doing the fumigation. No effective gas is known which is not highly poisonous to man. For this reason fumigation with such chemicals as cyanide must (and most cities have ordinances covering this point) be done by an experienced and licensed fumigator with a permit for each individual job. By judicious application of other forms of insecticides, however, fumigation can usually be avoided. It is a nuisance because it usually requires closing and sealing an entire building for upwards of 24 hours. Even so, it may be the most expeditious means of cleaning up a serious infestation which has gained too much headway to be quickly controlled by spraying or dusting. No inexperienced person should attempt large-scale fumigation and for this reason detailed directions will not be given here.



THE FIREBRAT is named because it lives in hot places around steam pipes and furnaces. As with silverfish, firebrats can be controlled with applications of DDT. (U. S. Department of Agriculture, BEPQ, photograph.)

It is convenient sometimes to fumigate a small box or trunk full of articles which should be entirely freed of insects before they are sealed up in storage. Two chemicals are relatively safe for this use. One is carbon tetrachloride, a common non-flammable cleaning fluid About two cupfuls should be used for fumigating a trunk. It will not injure clothing if the clean chemical is sprinkled directly on the fabric. The trunk must be tightly closed immediately and kept so for 24 hours or longer. Mixtures of ethylene dichloride and carbon tetrachloride (mixed 3 to 1 by volume) are also effective, one cupful being used for a trunk. The trunk should be tight and the temperature kept up to at least 70 degrees. Fumigation is even much more effective if the temperature is 80 or 90 degrees. Do not breathe more of the fumes than necessary while treating the trunk, and do not work in the same room for more than fifteen minutes at a time during the first 12 hours. Do not use carbon disulfide as a fumigant because it is too flammable and explosive for this purpose. Sulfur dioxide produced by burning sulfur is highly effective against insects but its use is not recommended. It is destructive to the tensile strength of fabrics, bleaches dyes, and its production involves a serious fire hazard. Formaldehyde has no value as an insect fumigant although it is used against various fungi and bacteria.

Soil Treatment

Soil treatment with chemicals is a frequent practice in termite control, either by itself or in conjunction with the reconstruction of foundations, etc., to isolate the wood from the ground and prevent the insects from reaching wooden elements. Termite control operators, however, often place too much emphasis on chemical treatment of the soil. As recommended at present this practice in brief consists in pouring orthodichlorobenzene or a mixture of 1 part coal tar creosote and 3 parts light fuel oil into a narrow trench dug around piers, drain pipes, and along concrete or brick foundation walls. Sodium arsenite is often applied but is dangerous because it may poison water supplies. Shrubbery is liable to be injured by soil treatment chemicals unless precautions are taken. Treatment of woodwork in place, sometimes advocated, is not very satisfactory, because the oil carrier often utilized is inflammable and will not penetrate the damp wood most liable to termite attack.

Poison Baits

Rats and mice not only damage furnishings themselves but they provide breeding places for fleas which they may infect with disease organisms. These vermin are repelled by liberal dustings of sodium fluoride wherever they run. If trapping is employed it should be systematic and on a considerable scale. Rats in particular are easily made suspicious. Baiting with poisoned food baits is often most productive of results. Directions for the control of rats and mice respectively are described in detail in Conservation Bulletins 3 and 36, which may be obtained free from the Fish and Wildlife Service, United States Department of the Interior, Washington 25, D. C.

RECOMMENDED READING

Further details relative to the identification and control of insect pests of buildings can be obtained from the United States Bureau of Entomology and Plant Quarantine in Washington 25, D. C. The following free literature is of particular interest to theatre management:

U. S. Dept. of Agriculture Leaflets

No. 101, "Injury to Buildings by Termites"
No. 109, "Eliminating Bats from Buildings"
No. 144, "Cockroaches and Their Control"
No. 145, "Clothes Moth"
No. 146, "Bedbugs"
No. 147, "House Ants"
No. 149, "Silverfish"
No. 150, "Carpet Beetles"
No. 152, "How to Control Fleas"
No. 182, "Housefly Control"
No. 186, "Domestic Mosquitoes"
No. 189, "Psocids, Annoying House Pests"
No. 192, "Centipedes and Millipedes in the House"

U. S. Dept. of Agriculture Circular

No. 369, "Industrial Fumigation against Insects"

Theatre Fire Tragedies Are Preventable

Suggestions Given on How to Prevent Fires And to Train Personnel for Any Emergency

By ROBERT S. MOULTON
Technical Secretary, National Fire Protection Association

Over 1,400 theatre fires occur in the United States every year, and they involve a total property loss of nearly $5,000,000, plus indirect losses which include a number of human lives that are incapacitated or snuffed out when these fires occur. This means that an average of four or five theatre fires are breaking out every day. It also means that in a year's time enough persons are killed or injured in theatre fires to total a spectacular loss. To cite a few examples:

Brockton, Massachusetts, March, 1941—The roof of the Strand Theatre collapsed during a general alarm fire, killing 13 members of the fire department and injuring 17 more.

Salt Lake City, Utah, May, 1943—Three firemen were killed when the roof of the burning Victory Theatre collapsed.

Calumet, Michigan, Setember, 1943—Slight damage was caused to the projection booth at the Calumet Theatre when fire started in a film, but two projectionists suffered burns, and were hospitalized at Memorial Hosital.

Dyersville, Iowa, October, 1944—Film ignited and in no time at all the projection room of the Plaza Theatre was a blazing inferno; the projectionist's face was burned before he managed to escape.

Harrisburg, Pennsylvania, February, 1945—A score of firemen were hurt, several of them seriously, in a five-hour battle to put out a fire which destroyed the Colonial Theatre building.

THEATRE FIRE CAUSES

The Projection Booth

The projection booth is where nearly half of our theatre fires get started, and it is in this area that most employe injuries or fatalities occur. Most theatres today are required to provide approved booths, modern projection machines designed to minimize the hazard of film ignition, and a variety of automatic safety devices developed to deal with fire if ignition does occur, but obviously this is not enough. It is essential for operators to possess judgment and sound training in what to do if a projection booth fire breaks out.

In the event of film fire, the projectionist should immediately shut down the machine and arc lamps, operate the shutter release at the point nearest to him, turn on the auditorium lights, leave the projection room, close the fire doors, and notify the manager. If the booth is equipped with automatic extinguishers, they will ordinarily put out the fire. If hand extinguishers are provided, they should be available just outside the booth exits so they can be reached in an emergency. While one employe is quietly notifying the manager, another employe may be able to put out the fire with hand equipment, from a position outside the booth, even before the automatic equipment goes into action.

It is never good judgment to remain inside the projection booth when fire starts because burning film is doubly treacherous: fire flashes through it, and it gives off toxic fumes. But very often such fires can be fought effectively, from a safe distance, with hand extinguishers.

Electric Wiring

Electric wiring is another important cause of fires. A theatre is generally built with approved wiring, but as time goes by, insulation deteriorates, connections loosen, equipment suffers from wear, and some managements grow reckless about permitting the use of makeshift repairs or installations. Electrical installations should conform with the National Electrical Code, and equipment should be handled strictly in accordance with manufacturers' instructions.

All wiring and appliances should be inspected at regular intervals. Inspection should include all parts of theatre, with special attention being paid to the booth, wall switches, fuse boxes, outlets, complicated wiring designs, and transformers. If anything looks or sounds

THE THEATREMAN'S CONCEPTION OF HELL is well represented by the fire that destroyed the RKO Strand Theatre, Dayton, Ohio, on January 27, 1943. Great damage can be caused by fires originating outside the theatre, as here the conflagration started in an adjoining restaurant. The progressive theatre owner, in cooperation with the local fire-department officials, will keep an eagle eye on all potential fire hazards present in his neighborhood.

suspicious, an expert should be called in at once to recheck and repair it.

Careless Smokers

Careless smokers, whether patrons or employes, are an ever-present hazard. Many a theatre has been destroyed by a fire which started from a cigarette butt or match, smouldered in a cushion or carpet until after the building was deserted for the night, then raged beyond control before anyone discovered it.

Pyromaniacs

Pyromaniacs are usually indistinguishable from "average theatre-goers" so it is easy for one who possesses this type of twisted intellect to buy a ticket and mingle with an audience. It is estimated that about 5 per cent of our theatre fires are of incendiary origin. Incendiary activities of a maniac, like those of careless or ignorant smokers, are difficult to curb. The best defense is constant vigilance, to keep the premises free from non-essential combustible materials and to detect incipient fires or signs of arsonist activity at the earliest possible moment.

Exposure Fires

Exposure fires—those which start outside the building and spread to it—account for a monthly average of three or four burned theatres. Fire-resistant construction of the theatre building exterior minimizes this danger, but no construction material can withstand an unlimited amount of heat. Fire walls and outside sprinklers also offer considerable protection against this hazard in some locations. The theatre manager can usually enlist the cooperation of local authorities to make frequent inspections of the surrounding neighborhood, and should do so in his effort to protect his own property.

Miscellaneous Causes

Miscellaneous causes common to all types of buildings are responsible for about one-fifth of our theatre fires. Spontaneous ignition of rubbish or of oily cleaning rags, flammable cleansing compounds, heating plant defects, carelessness, coals or hot ashes, hot steam pipes, defective air-conditioning equipment, and open lights or torches, often used in conjunction with repair work, are among the fire hazards continually reappearing in these miscellaneous causes.

A THEATRE FIRE OF OUTSTANDING INTEREST was that which occurred in the Laurier Palace Theatre, in Montreal, Quebec, on January 9, 1927. This fire caused the death of 78 persons and injury to 30 others. The use of a building of inferior construction and improper exits was a contributing factor. (All pictures used in this article were generously made available by and presented through the courtesy of the National Fire Protection Association.)

SAFETY MEASURE VIOLATIONS

The minimum requirements for theatre safety are outlined in the Building Exits Code.* However, it should be understood that these requirements are only the minimum. Better facilities and construction than outlined in the code provide a greater safety margin. A healthy trend toward higher standards is materializing in laws which have been adopted recently in several states and municipalities.

During the numerous investigations that always follow fire tragedies, it is significant that violations of recommended practices and standards are invariably discovered. Among the more dangerous conditions that are found over and over again are the following:

(1) Lack of adequate exits.
(2) Overcrowding.
(3) Lack of adequate fire protection equipment.
(4) Inadequately trained personnel.

Lack of Adequate Exits

Wherever large numbers of people are gathered under one roof, the suspicion of fire, whether false or real, is apt to start a panic. In theatre fires, more audience-injuries have resulted from crowding and trampling in an attempt to escape through blocked exits than from burns and other direct effects of the fire. In February, 1945, in Mechanicsville, New York, a false cry of fire was raised in the State Theatre and, before the audience, mostly 'teen-agers, could be brought under control, a girl and some boys had been injured in the rush for exits. Enough unobstructed exits should be provided to permit safe dispersal of a frenzied mob.

Assuming that a safe number of properly constructed aisles and exits are provided before a theatre is licensed, the manager still has the continual responsibility of making sure that the exit doors swing out, that they are readily opened from the inside, and that nothing interferes with their free use either inside the theatre or outside in the path of travel from the doors.

Any curtains or draperies should not extend over a door, but should be moved aside so that they cannot conceal its presence or interfere with its effective use in case of a rush. Doors should, of course, be kept unlocked at all times when the theatre is occupied and employes should not be permitted to begin locking up after a performance until the entire audience is out.

Overcrowding

Overcrowding is a flagrant violation of life safety standards. Theatre code requirements are based on an occupancy of not more than one person to every six feet of net floor area used for seating, and not more than one person to fifteen square feet of gross area of spaces not used for seating. A "holdout" line should be formed before every seat in the house is filled, and standing patrons should not be allowed to obstruct aisles, foyers, or exit areas.

* Published by the National Fire Protection Association in the National Fire Codes for Building Construction and Equipment and also available in separate form.

Fire-Protection Equipment

Fire-protection equipment includes automatic sprinklers, fire doors, asbestos proscenium curtains, emergency closing devices, hand fire extinguishers, wheeled extinguishers, fire hose, a fire-alarm system, and other fire-control equipment. Fortunately, many types of fire protection equipment can be installed after a structure is completed, so that deficiencies can be remedied at any time. The minimum quantity of such equipment is often specified in local codes. Where there is no such provision, the National Fire Codes* will serve as a guide. But again, it should be recognized that such provisions are minimum. Greater protection is an investment in greater safety.

To be effective when a fire emergency arises, fire protection equipment must be in good working order and it must operate or be operated properly. This means that the equipment must be inspected regularly, kept ready for instant use and handled in practice drills. The theatre manager can take care of these details with his own staff members, although cooperation from the municipal fire chief, or some other local authority equally concerned with fire defense, may not only enable him to do so more easily but may also lend authority to his direction. In case of a fire which gets beyond the control of the theatre staff, the municipal department can fight it more effectively if the chief is thoroughly acquainted with the threatened building.

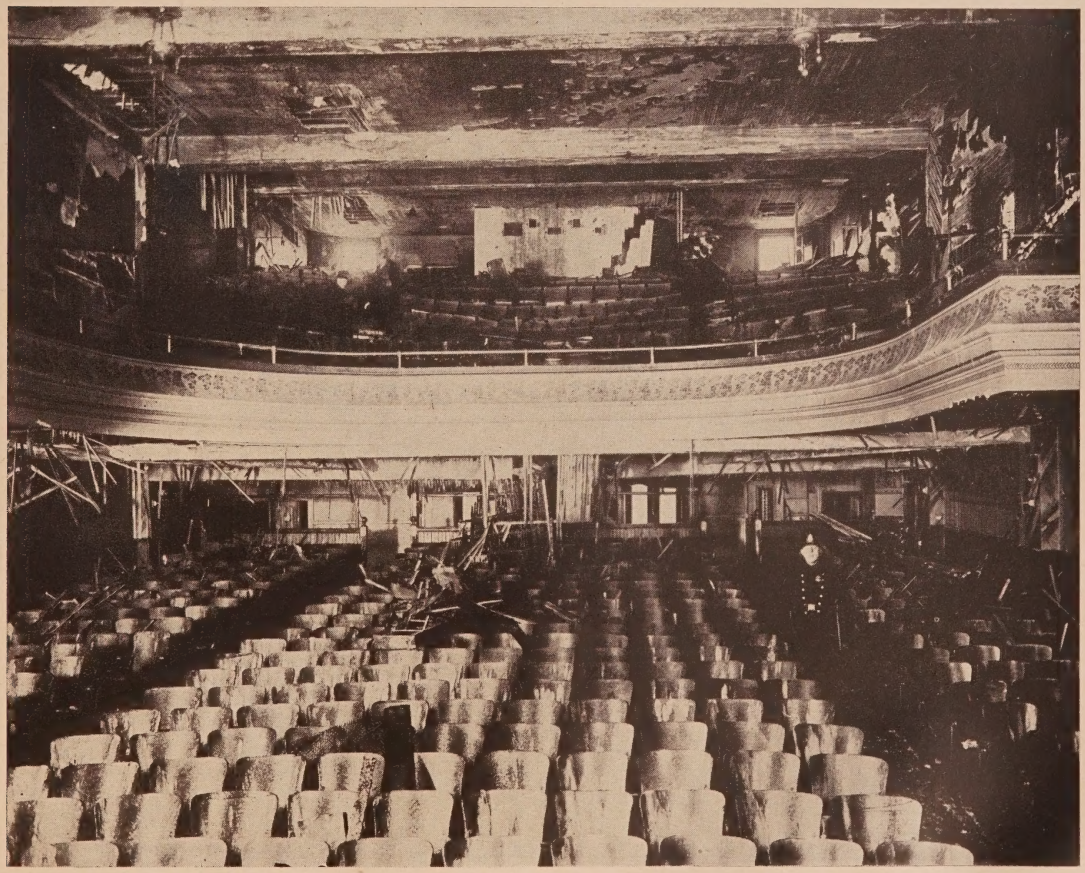
* Among the volumes of National Fire Codes published by the NFPA, the following have particular application to theatres: Volume I, Flammable Liquids, Gases, Chemicals and Explosives (motion picture film, oil-burning equipment, paint storage, etc.); Volume III, Building Construction and Equipment (exists, air conditioning, fire doors, etc.); Volume IV, Extinguishing and Alarm Equipment (extinguishers, hose, automatic sprinklers, etc.).

Inadequately Trained Personnel

Inadequately trained personnel is often excused because of labor conditions. It is understandable that employment of people with no previous experience is necessary, but failure to give them any special training in fire safety measures is a different story. Employes in any organization need a great deal of competent safety training and supervision. This is particularly true if they are boys under draft age, who approach a job with no lack of self-confidence and the natural impetuosity of youth, or older persons who have never worked in a theatre before.

Proof of the value of good employe training is a typical example which occurred in Schenectady, New York, one evening in April, 1945, when some film caught fire in the projection booth of the Cameo Theatre. Employes immediately closed the fire-proof shutters, turned on the house lights, called the fire department, and attacked the fire with fire extinguishers. The fire chief said his "hair stood on end" when the call came through, as a theatre fire is most dreaded by those who are aware of its tragic possibilities. The chief rushed to the theatre, found it emptied of its audience with little excitement, and the fire under control. After the first was out, he remarked, "It was an indication that constant training of 'what to do in case of fire' has taken hold in Schenectady . . ."

DEATH CAME TO 78 PERSONS, and injury to 30 more — only one of whom was over 16 years old — when fire destroyed the Laurier Palace Theatre, Montreal, on January 9, 1927. The brick front gave an appearance of good construction not borne out by the interior, which was of wood with a finish of plaster on wood lath. Fire originated in the center of the balcony, in the concealed space under the balcony floor. Some of the children were rescued, and some corpses removed, through the windows opening on the marquee. The medical report said that 52 died from smoke asphyxiation, 25 were crushed to death, and one died from burns.



THIS FIRE, apparently originating in an accumulation of waste paper beneath a steam radiator in a recess in the partition of the lobby, and ignited presumably by a carelessly discarded cigarette, resulted in heavy damage to the Colonial Theatre Building, Harrisburg, Pennsylvania, on February 6, 1945. Attempts of employes to extinguish the fire before sounding the alarm was a contributing factor in the fire that occured in the Telenews Theatre, San Francisco, on March 19, 1943. This fire (below) resulted in damage to the reviewing and projection rooms.

The size of the theatre and its staff of employes dictates the appropriate type of training program. In palatial theatres, a formal schedule, printed texts, and periodic training classes with outside instructors for key employes to whom considerable responsibility is delegated, may be advisable. In small theatres, the manager may have to train himself to handle most responsibilities and give his employes informal and individual instruction. A definite program needs to be established in any case. The local fire chief and other authorities outside the theatre should be scheduled to address the staff at intervals. In small communities, neighboring workers may be brought together for such meetings.

SUGGESTED TRAINING SCHEDULE

Whatever its form, the training schedule should achieve these results:

(1) All employes should know the regulations to which an audience is subject, the reason for the regulations, and how to act when violations are noticed or suspected.

(2) Ushers should have special instruction in the technique of seating audiences and handling, or calling the manager to handle, audience irregularities. If it is understood that seating a specified portion of the audience via the farther aisles is a safety measure in case of panic, because people tend to leave a theatre by the route used in entering, ushers will be more conscientious about their job the safe way. Similarly, they should understand the need for seeing that many small children are not grouped together without having a controlling number of adults seated among them.

(3) Employes should know where the theatre's fire protection equipment is located. All of them should know how to operate hand extinguishers, and selected employes should know how to handle other specified equipment. Each employe should know what he is supposed to do if a fire or panic emergency arises. In large theatres, one employe should send out a test signal over the fire-alarm system before each performance. In smaller theatres, the phone numbers of the nearest fire station, the police, ambulance, and doctors' services should be posted at every phone.

(4) All employes should know how to spot and report common fire hazards, and selected employes should be responsible for making frequent inspection of emergency exits, lounges, basement, outside alleys, and areas where smoking may occur. The manager or some employe representing him should check the auditorium, wash rooms, and foyers for smoldering cigarette butts before the theatre is closed up for the night.

(5) Special employes (projectionists, cashiers, janitors, watchmen, etc.) should be acquainted with special hazards they may encounter and the safest way to deal with such emergencies.

As a rule, when employes fail to cooperate in a safety program, they are either unaware of safe methods, or they are unconvinced that certain practices are unsafe. A thorough job of employe education, if it is continuous, will practically assure the success of safety program in any theatre.

Refresher on the Principles of First Aid

What-to-Do and When-to-Do-It Are Reviewed For Application in Unforeseen Emergencies

Theatre management is not entirely restricted to running cinema, either the physical property and its accoutrements or the entertainment films that are sold to the public. Frequently, accidents do occur and it is then that the management must know more than the mere entertainment field.

Self-education in first aid can be of inestimable value, but for those theatre owners and managers ever on the lookout for new ways in which to increase service to their patrons, the Red Cross suggests personnel training courses in first aid and accident prevention.

To show that such courses will benefit theatre owners and management, as well as the public, the American Red Cross contributes the following facts: (1) The training is an excellent safeguard in event of disaster; (2) it will immeasurably aid in handling those everyday emergencies which are liable to occur among personnel and patrons, such as fainting, falls, hysteria, heart attack, sprains and bruises; and (3) it serves to win good will by furnishing evidence to all that the management is concerned with the safety and welfare of employees and public.

Where first-aid training of ushers, restroom attendants and other theatre employees has been undertaken, the Red Cross states, results have more than repaid expenditure of time and effort. A chain of moving picture theatres in Virginia recently had all its ushers trained by the Red Cross in first aid, with resulting good publicity and favorable reaction of the public.

The Red Cross offers three progressive courses in first aid: the Standard (20 hours), Advanced (10 hours), and Instructor (15 hours) courses. For theatre managers who wish to organize for effective action in case of large-scale emergencies or disaster, the Red Cross suggests the formation of a Red Cross First Aid Detachment. Such a detachment is made up of from 15 to 50 persons with Advanced First Aid training. It offers the advantage of a trained, unified group always available and ready for immediate action.

In the past, the Red Cross points out, groups of actors have frequently displayed an interest in such a first aid setup. At the Theatre Mart in Los Angeles the cast of "The Drunkard" organized a First Aid Detachment shortly after Pearl Harbor. Although not called upon to act as a unit in a large-scale emergency, it was prepared and ready. It did function actively and cared for numerous minor injuries to personnel and audience. The actors feel that the detachment is a good morale-builder.

The Red Cross Home Accident Prevention course (12 hours) and the Junior Accident Prevention course (15 hours), the latter for boys and girls of 12 through 14, both deal with the discovery and correction of hazards such as exist in theatres. Employes taking the courses become hazard-conscious and hazard-wise and are therefore able and anxious to eliminate dangers in the theatre building.

Those interested in organizing classes in any of the first aid or accident prevention courses or in forming a First Aid Detachment may obtain information regarding requirements and training by communicating with their Red Cross chapter.

That the theatre owner and manager may have ready-reference, "refresher" material handy, this article has been prepared. What follows has been, by permission, abridged from the pamphlet, "First Aid," published by the Metropolitan Life Insurance Company, which further cooperated by making available the illustrative material.

WHAT TO DO FIRST

1. **Take charge.** A life may be lost for want of someone to take charge and give first aid when an accident has happened.

2. **Examine the victim carefully and thoroughly to find out how seriously he is hurt.** Do not be satisfied with noting only the injuries that are plain to be seen. If necessary, rip or cut the clothing from the injured part to get a clear view. Look especially for wounds, broken bones, burns, signs of shock. Treat the most serious injury first. Severe bleeding, stoppage of breathing, and poisoning are the big three emergencies which require instant first aid to prevent death.

3. **Move the victim only if absolutely necessary, and then with the greatest caution.** Rough handling will make a bad matter worse. In case of simple fracture, for example, one or both ends of the broken bone may be pushed through the skin if the victim is not handled properly.

4. **Act promptly but not hastily.** Decide what needs to be done and do it. Handle various injuries as suggested in these columns. Keep calm and quiet. Do whatever is necessary to save the victim's life and to keep him warm and quiet, but no more.

5. **Send for a doctor.** In calling for the doctor, tell him where the victim is, the nature of the injuries, and what you have done.

SHOCK

All serious injuries and most slight ones cause shock. Shock is dangerous. Measures should be taken to prevent it or to lessen its severity as soon as urgent life-saving measures, such as the control of severe bleeding, have been started.

Signs of shock may not appear for some time after an injury. A person in a state of shock seems stupid and loses interest in what is happening, or he may be partly or totally unconscious. However, if there is bleeding, he may act restless and excited. His skin is pale and covered with a cold, clammy sweat; his lips and nails may be blue. His pulse is rapid and hard to find, and his breathing is feeble. The victim usually complains of feeling cold.

FIRST AID. The development of shock may be prevented, or its severity lessened, by taking the following measures in all cases of serious injury. Keep the victim warm and lying down until the doctor arrives. Lay him flat on his back with his head level with the rest of his body unless some other position is advised for a particular injury. Keep him comfortably warm with blankets placed under and over him. If he still complains of feeling cold, or if the environment is cold, supply external heat also in the form of hot-water bottles or some other heating device tested on your own forearm. Either chilling or overheating is harmful. If the victim is conscious and if there are no signs of external or internal bleeding or head injury, it may be helpful to give him a stimulant such as aromatic spirits of ammonia (½ teaspoonful in ½ glass of water) or sweetened hot coffee or tea or hot water.

HOW TO STOP BLEEDING FROM EXTERNAL WOUNDS

A wound is any break in the skin or mucous membrane, either within the body or on its surface. In dealing with an external wound, the first and most important thing to do is to stop severe bleeding if it is present.

Blood flowing in quick spurts means that an artery has been cut; a steady flow means that a vein has been cut.

Pressure Methods

Bleeding from an artery can usually be stopped by pressing with the hand or fingers at the spot where the artery crosses a bone. The main pressure points for the control of arterial bleeding are shown in Figures 1 to 7. Pressure should be made on the pressure point nearest the wound between the wound and the heart.

Bleeding from a vein (steady flow), can usually be stopped by bandaging a compress in place over the wound or by pressing with the fingers near the edges of the wound until a compress can be obtained. Elevating the wounded limb also helps to control bleeding from a vein in an arm or leg.

Use of a Tourniquet

So many serious results, including the necessity of amputating a limb, have followed the use of a tourniquet that only when the pressure methods just de-

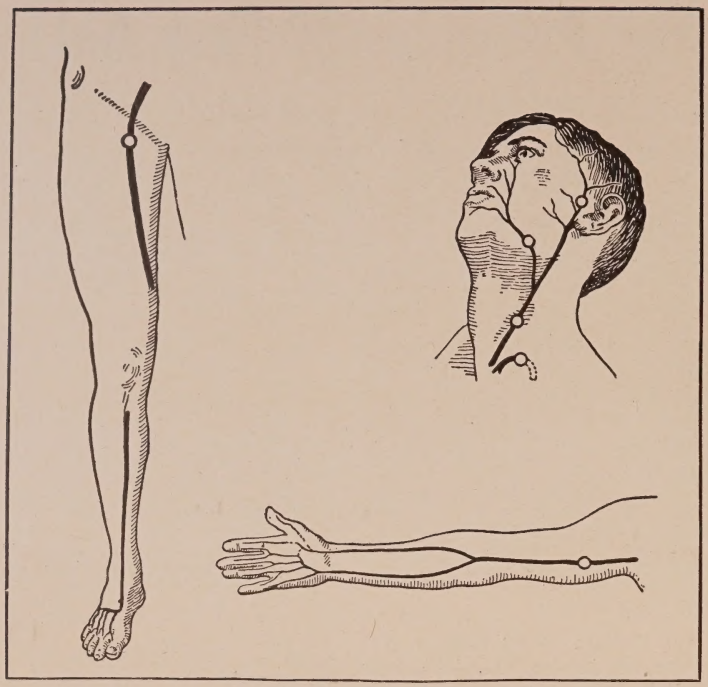


FIGURE 1.—Pressure points for stopping the flow of blood from external wounds are six, indicated in these drawings. To stop the flow of blood, press on the point nearest the wound, but located between wound and the heart. The theatre manager should make sure that his staff is firmly cognizant with these pressure points: one on the leg, one on the arm, and four on the neck and head. To stop bleeding is the first thing to do.

scribed fail to check bleeding from one of the limbs should a tourniquet be applied. If it is necessary to use a tourniquet, tell the doctor that you have done so as soon as he arrives. Any fairly wide flat band long enough to go twice around the limb will serve as a tourniquet. A triangular bandage folded in the form of a cravat, a necktie, stocking, or strip of cloth torn from clothing may be used. Do not use cord, rope, or wire.

The two places to apply a tourniquet are (1) a handbreadth below the armpit for bleeding from the arm (Figure 8) and (2) a hand breadth below the groin for bleeding from the thigh or leg. Wrap the tourniquet around the arm or leg over a firm (but not hard) pad placed on the inside of the arm to protect the artery and distribute pressure. Several thicknesses of gauze or a folded handkerchief may be used for the pad. Tie the tourniquet with a half knot, and then tie a small stick with a square knot over the first one. Tighten the tourniquet by twisting the stick. Do not twist too hard—just enough to stop the bleeding. Loosen the tourniquet every 15 minutes to let blood circulate in the limb below the tourniquet. Gangrene may develop if the blood supply of the limb is blocked off too long. While the tourniquet is loosened, control bleeding by pressure on the compress over the wound. If severe bleeding does not begin again within one minute after loosening the tourniquet, do not retighten it but leave it in place ready to tighten again in case the bleeding returns. Never cover the tourniquet with bandages or blankets.

If a victim is taken to a hospital before a physician arrives, write TK on his forehead with iodine, lipstick, soft pencil, or crayon, and also the time the tourniquet was applied. By doing this, the persons in charge of the victim will know when the tourniquet must next be loosened.

If for any reason severe bleeding cannot be checked by pressure on a pressure point or by the application of a tourniquet, do not hesitate to press with the fingers directly over the bleeding point. Replace the fingers, as soon as possible, with a sterile gauze compress, a freshly laundered handkerchief, or other sterilized material.

FIGURE 2.—To stop bleeding of head above the eyes, press just in front of the ear, as shown in this drawing. The more familiar a person is with these various points, the better for him in cases of emergencies.

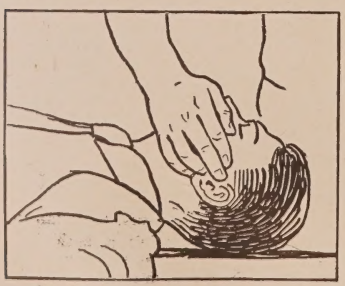


FIGURE 3.—Bleeding of cheek below the eyes is stopped by pressing in the notch on the side of the jawbone that is 1 inch to 1½ inches in front of the angle of the jaw, as shown in this illustration. Constant familiarity with these points and their instant location should be part of every employe's first-aid training.

INTERNAL BLEEDING

Internal bleeding resulting from wounds of the internal organs, such as the brain, lungs, stomach, and intestines, cannot be seen. It causes weakness, pallor, faintness, feeble and irregular breathing, and, usually, loss of consciousness. While waiting for a doctor, treat as for shock (which see) but give no stimulants.

PREVENTING INFECTION IN WOUNDS

Every break in the skin carries with it the danger of infection. Germs may be present on the skin, fingers, clothing, and unclean dressings, and in droplets sprayed from the mouth or nose in sneezing, coughing, laughing, or talking. Do not touch a wound with cloth which is not sterile (free of germs) or with the fingers unless bleeding can be stopped in no other way, and do not cough, sneeze, or breathe into a wound.

The cleansing and disinfection of all serious wounds should be left to the doctor. First aid stops with the checking of the bleeding, the application of a sterile dressing, and measures taken to prevent or lessen the severity of shock.

For small wounds like cuts and scratches, which probably will not be seen by a doctor, first paint the wound with an antiseptic, such as mild tincture of iodine

FIGURE 4.—To stop bleeding from neck or throat, place your thumb against the back of the victim's neck and your fingers in the depression at the side of the windpipe (not over it), with one finger above the wound and one finger below it. Press the fingers and thumb toward each other until the bleeding stops.

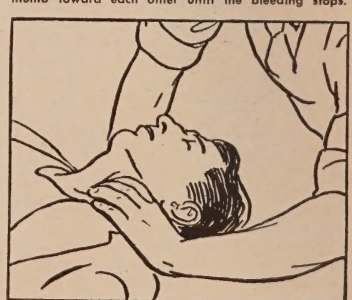


FIGURE 5.—To stop bleeding from lower two-thirds of the arm and hand, place fingers half-way between the arm pit and the elbow on the inside of the arm, and press fingers and thumb toward each other with the arm bone in between. (If the arm is fat, place your own hand beneath it.) Raising the arm helps.

(2 percent solution), and when the iodine is dry, cover it with a sterile (germ-free) cloth pad, or compress.

If iodine is the antiseptic selected, remember that the iodine solution becomes stronger with age owing to the evaporation of alcohol. Therefore, old solutions should not be used. In purchasing iodine, ask the druggist for a 2-percent solution, as ordinary tincture of iodine is too strong.

A supply of individual sterile gauze compresses in sealed packages (for sale at any drugstore) should be kept in the first-aid kit or medicine cabinet in every home. If such compresses are not at hand, scorch a piece of clean, unstarched cloth with a hot iron. Old pieces of linen so treated make good compresses.

A sterile compress becomes non-sterile (contaminated) when it is touched with the fingers or any object not sterilized. Hence, in unfolding or unrolling the compress, take care to touch only the outer surface and place the inner untouched surface over the wound. Make sure that the compress is large enough to cover the wound completely. Hold it in place by a bandage or adhesive tape.

Punctured and Lacerated Wounds

Deep wounds caused by narrow, pointed instruments, such as nails, ice picks, scissor blades, and pitchfork tines; lacerated or torn wounds; and wounds caused by explosions of gunpowder, are particularly dangerous. The germs lodged in a wound of this kind cannot be reached and destroyed by an antiseptic, and the wound is almost sure to become infected unless it is cleaned out by a physician.

The germs of lockjaw (tetanus), which thrive without the presence of oxygen, are especially apt to multiply and manufacture toxin (poison) in deep wounds with narrow or sealed openings, and in lacerated wounds with crannies or pockets from which air is shut out. Besides treating the wound itself, the physician may wish to give tetanus antitoxin. Tetanus antitoxin must be given immediately to insure its effectiveness.

ASPHYXIA

Asphyxia may be caused in a number of different ways. Some of the more common ones are (1) obstruction of the air passages either from without, as in smothering and strangulation, or from within, as in choking and submersion, so that air cannot reach the lungs; (2) paralysis of the respiratory center of the brain, as in electric shock, the swallowing of drugs which act as nerve poisons, and the breathing of excessive amounts of anesthetic gases like chloroform, so that the breathing muscles cannot work; (3) interference with the oxygen-carrying function of the red blood corpuscles, as in the inhalation of a gas which acts as a chemical asphyxiant—for example, carbon monoxide; and (4) lack of oxygen in the air breathed, as in storage bins or airtight vaults, where oxygen has been replaced by carbon dioxide through the process of oxidation.

Choking and Strangulation

Rescue by quickly cutting any constriction around the neck or, if something is lodged in the throat or windpipe, by passing a finger into the throat and hooking the finger around the object in order to remove it. If the object is deeper down and cannot be removed by the finger, slap the victim vigorously on the back between the shoulder blades. While you are doing this, the victim can assist by lying crosswise on a bed on his abdomen with his head and shoulders hanging over the side. If the victim is a child, hold him upside down by the heels and slap his back.

FIRST AID—Send for a doctor at once, or rush the victim to a doctor's office or hospital, if these measures do not work. If, after the object has been removed, the victim is not breathing, start artificial respiration immediately.

Electric Shock

Electric shock occurs when an electric current passes through a person's body from a conductor of electricity to a ground. The conductor may be an electrically charged wire or rail, or faulty electrical equipment. When a person is struck by lightning his body acts as the conductor. The victim of electric shock suffers sudden loss of consciousness, stoppage of breathing due to paralysis of the respiratory center in the brain, and possibly severe burns.

Contact must be broken immediately between the victim and the electrical conductor. Do not touch the victim's skin or clothing (which may be damp with perspiration) with your bare hands while he is still in contact with the current. It is as dangerous for you to touch his skin or his clothing, if it is damp, as to touch the wire or rail itself. Turn off the current if you are near the switch or powerhouse. If this cannot be done, stand on a folded dry coat or on newspapers

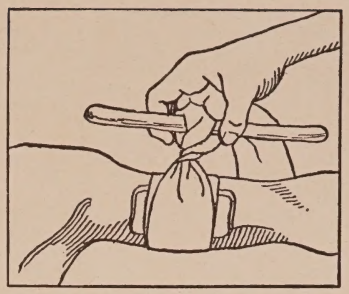
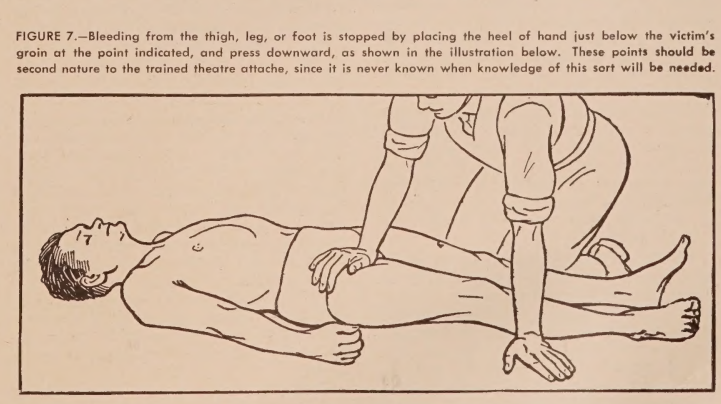


FIGURE 8.—A tourniquet is used in cases of severe bleeding not stopped by application of pressure as indicated. It should be used only in emergencies and then only with the greatest care and attention to the victim. The tourniquet should be loosened every 15 minutes, lest mortification of the distal portions set in.

FIGURE 6.—Bleeding from the shoulder, armpit and upper part of the arm is stopped by placing your thumb or fingers in the hollow behind the victim's collarbone, and press against the upper surface of the first rib, see above.

FIGURE 7.—Bleeding from the thigh, leg, or foot is stopped by placing the heel of hand just below the victim's groin at the point indicated, and press downward, as shown in the illustration below. These points should be second nature to the trained theatre attache, since it is never known when knowledge of this sort will be needed.



or a dry board, and with one hand protected with several thicknesses of dry cloth or newspaper or with tested rubber gloves grasp a dry part of the victim's clothing and drag him away from the conductor. It may be possible to push a live wire off the victim with a dry wooden stick, or to pull the victim off a live wire or rail with a piece of dry rope or handkerchief looped over his foot or hand.

FIRST AID—After contact has been broken with the electrical conductor there is no danger of shock in touching the victim. A person who has been struck by lightning may be touched at once, since the electric charge has been expended into the ground. If the victim is not breathing, start artificial respiration immediately and have a physician summoned. Apply dressings to the burns, if there are any, after the victim has been revived.

Inhalation of Carbon Monoxide

This odorless, deadly gas combines with the oxygen-carrying pigment (hemoglobin) of the red blood corpuscles more rapidly, more easily, and more firmly than oxygen can. Hence it causes asphyxiation by keeping the blood corpuscles from taking up oxygen from the breathed-in air.

Manufactured gas used for lighting, cooking, and heating contains carbon monoxide. It may escape from ill-fitted gas water heaters and gas stoves, loose gas fixtures and valves, leaky gas tubing, and gas furnaces not connected to outdoor air by flues. Many people think that accidental asphyxiation from manufactured gas occurs only when there is a leak. This is not true, as carbon monoxide may be given off when the gas is burning. Natural gas, which normally does not contain carbon monoxide, may produce it when the flame comes in contact with cold metal, as when a large boiler of water is put over a gas flame.

Carbon monoxide is also produced in the burning of all carbon-containing substances, such as coal, oil, wood, and gasoline, when there is not enough oxygen present for complete combustion. It is present in the smoke from burning buildings; in the fumes from coal stoves or furnaces, especially when they have been banked for the night; and in the exhaust fumes from automobiles. It is important to guard against the accumulation of carbon monoxide in enclosed places, such as bedrooms and garages, by providing adequate ventilation. The motor of an automobile should never be started in the garage when the door is closed. In rescuing a victim of carbon-monoxide asphyxiation, make sure that you protect yourself against the gas. If a protective mask is on hand, use it. If not, tie a rope around your waist and instruct someone on the outside to hold the other end and rescue you in case you fall. A wet cloth tied over your mouth and nose is useless.

FIRST AID—Get the victim to fresh air at once. If breathing has stopped or comes in gasps, start artificial respiration and continue until natural breathing is restored or until the doctor pronounces him dead.

The recovery of a victim of gas asphyxiation is favored by administering oxygen, or, better still, a mixture of oxygen and carbon dioxide. The carbon dioxide stimulates faster and deeper breathing while the oxygen is driving the carbon monoxide out of the blood. Police and fire departments and some hospitals have oxygen-carbon dioxide inhalators. Send for one, if possible, but remember that the inhalator will not restore breathing in an asphyxiated person. Artificial respiration must be started and continued until the victim breathes naturally. Then he should be allowed to continue breathing through the inhaler of the inhalator until he is fully conscious.

During the process of resuscitation and for some time afterward keep the victim warm and aid circulation by rubbing the limbs toward the heart. Insist on complete rest for some time after natural breathing begins. Even slight exercise is dangerous.

Lung-Irritant Gases Inhaled

Some gases which may be inhaled, such as certain industrial gases and war gases, have an irritant or corrosive action on respiratory tract. Among them are ammonia and nitrous oxide fumes, hydrogen sulphide, chlorine, phosgene, and mustard gas. Persons who have been exposed to irritant gases must be made to lie down at once and keep absolutely quiet. The action of some of these gases may be delayed, and the victim may show few or no symptoms immediately after exposure. However any exertion whatever, even sitting up, may have serious or even fatal results. Since an irritant gas inflames the lungs, it is dangerous to give artificial respiration. Under no circumstances should it be resorted to unless the victim has stopped breathing, and then only with great caution.

CHEMICAL POISONS SWALLOWED

The signs and symptoms of poisoning caused by swallowing a poisonous substance vary with the poison taken. Nausea, vomiting, pain, diarrhea, collapse, and convulsions are some of the possible immediate effects. Sometimes the victim becomes unconscious. When a poison has been swallowed, it may be possible to determine its nature from an examination of the surroundings or from what the victim tells you. But do not lose time trying to discover what the poison was. Every moment of delay means that more and more of the poison is being absorbed into the system. Unless prompt action is taken, the victim may soon be beyond help. Call a physician at once and, while awaiting him, start first aid.

FIRST AID—Dilute the poison and wash out the stomach by inducing vomiting, unless a strong acid or caustic alkali in concentrated form has been swallowed or the victim is unconscious. Both of these measures are accomplished by giving the victim an emetic. An emetic is a substance that causes vomiting. Some emetics which may readily be prepared in practically every theatre are as follows:

1. Warm salt water—1 tablespoonful of table salt to one glass of warm water.
2. Warm mustard water—1 teaspoonful of dry mustard to one glass of warm water.
3. Soapy water—a piece of mild soap shaken up in warm water to make a good suds.

If it is necessary to induce vomiting after the victim has swallowed several glassfuls of the emetic, tickle the back of his throat. Vomiting should be induced repeatedly until the fluid coming from the stomach is clear.

In addition to diluting the poison and getting it out of the stomach by inducing vomiting, an antidote may be given if is known and on hand. An antidote is a remedy which counteracts (works against) the poison. The antidote for many of the ordinary household preparations containing poisons is given on the label.

In all cases keep the victim warm and quiet after everything possible has been done to remove or counteract the poison. A soothing drink, such as the raw whites of two or three eggs in a little water, one or two glasses of milk, or a thin paste of starch or flour and water should be given if the victim can swallow. A stimulating drink, such as hot coffee, may be helpful. If the victim has stopped breathing, give artificial respiration at once.

Antidotes for Some Common Poisons

Acids, Strong—Hydrochloric, nitric, sulphuric, and so forth. (See under Alkalis.)

Alkalis, Caustic—Ammonia, caustic lime (quicklime), caustic soda, caustic potash, lye, etc. The victim's lips, mouth, and tongue are stained and burned. Usually it is unwise to force vomiting if the poison was taken in concentrated form, for fear of rupturing the corroded walls of the esophagus and stomach. After diluting and counteracting the poison as described below, give a soothing drink, such as a wineglassful of olive oil, a glass of milk, or flour and water. To dilute and counteract an acid swallowed, give two glassfuls of diluted milk of magnesia, or two tablespoonfuls of baking soda in a pint of water, or finely divided chalk in water, or lime in water (if necessary, scrape plaster off the walls, powder it, and mix it with water). To dilute and counteract a caustic alkali swallowed, give a wine glassful of vinegar or the juice of four lemons in a pint of water.

Arsenic—Induce vomiting repeatedly by giving several glassfuls of warm mustard water or warm salt water. In the meantime, send to the drugstore for freshly prepared hydrated oxide of iron and magnesia, the official arsenic antidote. When it comes, give the victim a wineglassful and induce vomiting again.

Mercury—Give the whites of from three to five eggs immediately, and then induce vomiting repeatedly by giving warm mustard water or warm salt water.

Carbolic Acid—Phenol and preparations containing it. Immediately give soapsuds or two tablespoonfuls of Epsom salts in a pint of water, and follow with enough lukewarm water to induce vomiting. Then give flour and water to soothe the injured tissues. Do not give oils or fats. Alcohol checks the caustic action of carbolic acid, and skin burns caused by it should be washed with diluted alcohol, whiskey, or brandy. But alcohol should not be given for carbolic acid taken in-

ternally, since it hastens the absorption of the poison.

Iodine—Give several glassfuls of a thin paste of starch in water or flour in water and induce vomiting until the vomited material no longer has a blue color.

BURNS AND SCALDS

The purpose of the first-aid treatment of burns is (1) to relieve pain, (2) to prevent infection in all burns in which the skin is broken, and (3) to prevent loss of tissue fluid in extensive burns. Shock nearly always develops when large areas of skin are burned (see Shock).

For small minor burns characterized by reddened unbroken skin or surface blisters, apply a paste of baking soda in water or sterile petrolatum and cover the burned area with a sterile gauze dressing.

For severe burns—deep burns and all extensive burns—get medical aid as quickly as possible. Contamination with germs from the mouth and nose is responsible for most serious burn infections. In giving emergency treatment, tie a piece of gauze or any clean cloth of suitable length over the mouth and nose to serve as a mask. If material for a cloth mask is not available, keep the mouth closed. Cover the burned area with a liberal amount of sterile petrolatum using a sterile (boiled) flat instrument as a spreader. Over the petrolatum lay strips of sterile gauze. Then apply a smooth thick layer of sterile gauze and bandage the entire dressing firmly in place. Keep the victim quiet and comfortably warm until the doctor arrives.

Chemical Burns

Chemical burns are caused by chemicals such as strong acids and alkalis. Immediately strip off all clothing which has come in contact with the chemical and flood the skin with large quantities of clean water. Then give first aid according to the degree of the burn. If there has been any delay in giving first aid, do not use water. Get medical aid at once.

UNCONSCIOUSNESS

Unless all the circumstances are known, it is sometimes very difficult to determine the cause of unconsciousness. Certain cases, notably skull fracture, apoplexy, and drunkenness, are frequently confused. If a person found unconscious smells of alcohol, for example, he may be treated as a case of common drunkenness, whereas actually he may have had a stroke of apoplexy or suffered a skull fracture. In all doubtful cases, keep an unconscious person lying down, warm, and quiet until medical aid can be obtained.

Some common causes of unconsciousness follow.

Fainting

Fainting usually results from some emotional shock, such as fear or bad news, but may accompany slight injuries, the sight of blood, exposure to overheated rooms, a want of food, or fatigue.

A person about to faint becomes dizzy and weak and turns pale. He either sinks into a chair or falls unconscious.

FIRST AID—If you notice that a person is going to faint, you can sometimes revive him by bending his head down between his knees. If he does not improve, lay him flat on his back and lower his head by shoving a folded coat or blanket under his hips or by raising his feet and legs. Loosen all clothing around his neck and waist. See that he gets plenty of fresh, cool air. Hold smelling salts or a handkerchief containing a few drops of aromatic spirits of ammonia under his nose every minute or two. When consciousness returns, the person should continue to lie quiet for a while before getting up. If the faint lasts for more than a few minutes send for a doctor.

Apoplexy

Apoplexy is commonest in elderly people. It is caused by the rupture of a blood vessel in the brain.

The victim is unconscious and snores in breathing. His face is usually red and his pulse strong but slow. The pupils of the eyes are usually unequal in size, and one side of the body or one limb is more limp than the other. The mouth may be drawn to one side.

FIRST AID—Send for a doctor. Lay the victim on his back and raise his head and shoulders. Apply cold cloths or an ice bag to his head. If the victim vomits, turn his head to one side so that he will not choke. Do not give stimulants.

Epilepsy (Fits)

The cause of epilepsy is not known.

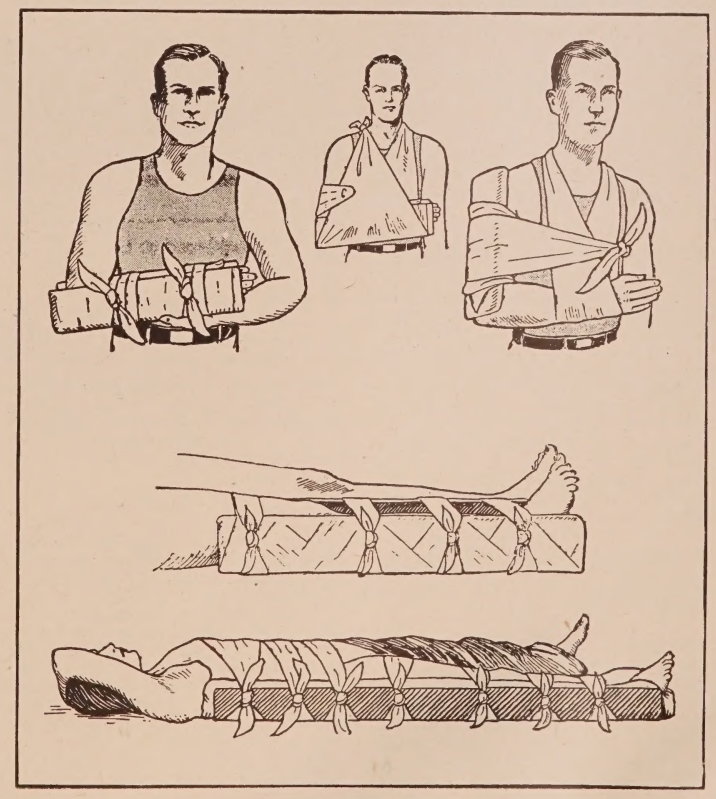
At the beginning of an epileptic fit the victim falls forcibly and loses consciousness. He may stop breathing momentarily and turn blue. The fit is marked by strong jerking movements of some or all of the muscles, and often there is frothing at the mouth. The blue color quickly passes off.

FIRST AID—Send for a doctor. Do not try to restrain the victim's movements more than is necessary to prevent him from hurting himself. Lay the victim on his back and loosen any tight clothing. Place a cloth pad or small stick wrapped in cloth between his teeth to keep him from biting his tongue. Remove anything from his mouth which might choke him. Keep him warm with blankets or coats. Do not give artificial respiration during the blue stage.

Diabetes

Unconsciousness of two quite different types may occur in diabetes. Persons

FIGURE 9.—Fixed-traction splints help to keep the broken ends of the bone apart and in line to prevent injury to the soft tissues. Top right shows a splint for a broken forearm or wrist and a sling (upper, center) to support it. Upper right shows splint and sling for a broken upper arm. Middle is seen a splint for a broken leg. Bottom is the splint for a broken thigh. Splints, when needed, should be applied by a physician or an expert.



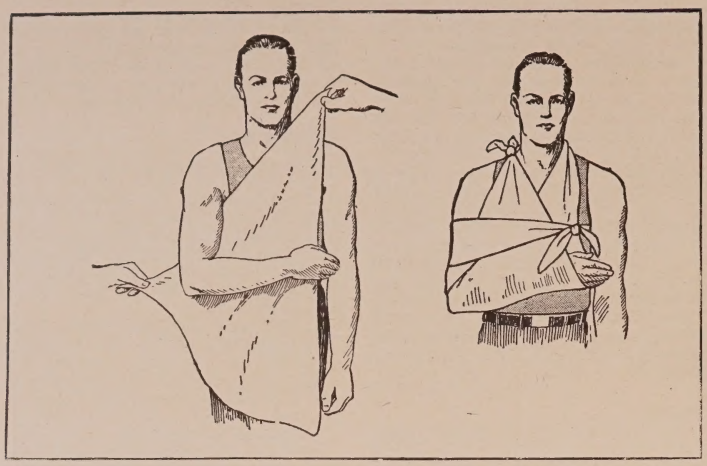


FIGURE 10.—The triangular bandage is a convenient item of first-aid equipment. At left is shown the first position for adjustment of such a bandage to make a comfortable sling, and at the right is the completed sling for a fractured collarbone. Triangular bandages should be part of every first-aid kit, and all employes should be trained to become as expert as possible in their use, not only as slings but as bandages for various parts of body.

with diabetes often carry a diabetic identification card and a lump or two of sugar. If a diabetic is found ill, give him sugar or sweetened fluids, and if this does not cause definite improvement within 15 minutes, call a doctor.

FRACTURES

A fracture, or broken bone, when there is no break in the skin, is a simple fracture. When there is a wound extending from the fracture to the surface of the skin, the injury is a compound fracture. Careless first-aid handling of a simple fracture increases the danger of shock, and may cause the splintered ends of the broken bone to cut through the tissues and skin, thus causing a compound fracture.

Fractures of the Arms and Legs

The victim complains of pain at the point of the break, and the pain is more severe on pressure or movement. He may not be able to move the limb. The broken ends of bone may be overlapping noticeably, or the injured limb may be shorter or bent when compared with the uninjured side. Swelling is usually marked and appears quickly.

FIRST AID—When in doubt, handle the injury as a fracture. Send for a doctor. Keep the victim lying down and warm to combat shock. Stop severe bleeding if it is present, and then cover the wound with a sterile dressing. If it is necessary to move the victim, the limb must be splinted to keep the broken ends of the bone from moving about and doing further damage.

Splints

Fixed-traction splints are now considered to be the most effective splints for fractures of the limbs. Traction, or pull, at the end of a broken limb, when properly exerted by a fixed-traction splint, helps to keep the broken ends of the bone apart and in line and to prevent further injury to the soft tissues. However, fixed-traction splints, unless applied by a physician or trained first-aid worker, may do more harm than good.

If you have not received the necessary training or if fixed-traction splints are not available or cannot be improvised, use ordinary splints. Any rigid material —a light board or broom handle, for example—which is long enough to reach beyond the joints above and below the break will serve as a splint. Often a pillow or folded blanket can be used to splint a broken forearm or lower leg; a magazine or several layers of newspaper will serve as a splint for a broken forearm. The splint should be well padded with cloth or cotton on the side that goes next to the injured limb. Bandage the splint firmly but gently to the injured limb, but do not place bandages over the point of the fracture. (Figure 9.)

Fractured Collarbone

As the victim stands or sits straight, the shoulder on the injured side may hang much lower than the other shoulder.

FIRST AID—Place a large pad under the armpit. Make a triangular sling (Figure 10) from a piece of cloth about 3 feet square. Support the arm on the injured side by the sling. Take the victim to a doctor.

Spine

This injury is extremely serious. Wrong handling may result in damage to the spinal cord, thus causing permanent paralysis.

Pain in the neck or back may be the only symptom. If the victim cannot move his fingers, his neck is probably broken. If he can move his fingers but not his feet and toes, his back is probably broken. Nevertheless, the victim may be able to move both his hands and feet and yet have a spinal fracture.

FIRST AID—Send for a doctor at once. Do not move the victim unless absolutely necessary. Keep him warm with blankets or coats and external heat. Do not let him try to sit up, and do not lift his head, even to give him a sip of water.

If the victim of a broken neck must be moved he should be transported face upward on a door, a wide board 5 feet or more in length, a shutter, or a similar rigid support.

If the victim's back is broken, he should be transported on the rigid support face downward.

If the location of the spinal injury is unknown, transport him face upward.

Two or more persons will be needed to place the victim in the correct position onto the board or door. His body must be moved as a unit, with no tilting forward or backward of the head in case of neck fracture, and with no bending of the back in case of fracture of the spine below the neck. Transportation must be accomplished without jolts or jars, and the victim must be kept warm during the process.

Skull Fracture and Concussion of the Brain

If a person has received a severe blow on his head or has been knocked unconscious even for a very short time, a fracture of the skull or brain concussion should be suspected. Even though the victim of a severe blow on the head is conscious and no wound or bruise can be seen, he must be handled as a case of skull fracture or concussion of the brain.

FIRST AID—Send for a doctor. Lay the victim on his back, with the head slightly elevated. Keep him warm and quiet. Give him nothing by mouth. Check severe bleeding, if present, by placing a gauze compress over the wound.

DISLOCATIONS

In dislocations, the joint looks out of shape when compared with a similar joint, and its motion is limited.

FIRST AID—Send for a doctor. Do not try to put the bone back in place except in dislocations of the finger and lower jaw. For all other dislocations, as of the shoulder, elbow, knee, or hip, merely support the joint in a comfortable position. For pain, apply cloths frequently wrung out in very cold water.

Dislocated Finger

Face the injured person and pull the end of the finger toward you. With the thumb and forefinger of the other hand, gently press on the dislocated joint until the bone slips into place. If the first attempt is not successful, see a doctor. Do not try to replace a dislocation of the joint at the base of the thumb.

Dislocated Jaw

Wrap your thumbs in several thicknesses of cloth to protect them from the victim's teeth. Then put your covered thumbs into the injured person's mouth, resting them on his lower teeth well back on each side, and grasp the jaw under the chin with your fingers. Press first downward and then backward with the thumbs, and upward under the jaw with

the fingers. As the jaw closes, slip your thumbs off the teeth to the inside of the cheeks, so they will not be caught between the teeth when the jaw springs into place.

SPRAINS, STRAINS, AND BRUISES

Sprains

When the ligaments supporting a joint or connecting bones are torn, a sprain is the result. There is pain, swelling, and usually discoloration. What seems like a bad sprain may be a fracture. Therefore, a doctor should be called for a sprain, unless it is slight.

FIRST AID—Raise the injured joint, so that it will get less blood. Apply cold cloths or ice packs for several hours.

Strains

A strain is like a sprain, but it is the muscles, not the ligaments, which are injured.

Relieve the pain by putting the part to rest. The application of heat and light massage (rubbing the limb upward toward the body) are helpful. For a severe strain consult a doctor.

Bruises

A bruise is an injury usually caused by a fall or a blow. The skin is not broken, but the tissues under the skin are injured, resulting in the breaking of small blood vessels.

Signs of bruises are pain, swelling, and black-and-blue marks. A black eye is a bruise.

Apply cloths wrung out in cold water or ice packs to relieve the pain and swelling. If the blow was severe, have a doctor examine the injured person.

FIRST AID FOR COMMON AILMENTS

Boils

Boils result from an infection of the hair pits or oil glands in the skin. The germs responsible are especially apt to get a foothold on a skin surface constantly irritated by the rubbing of clothing—the neck, armpits, and buttocks, for example. Hot salt-water applications may be used to relieve pain. A doctor should always be consulted for a severe boil.

Earache

A doctor should be consulted as soon as possible for earache or for a discharging ear. Loss of hearing or mastoid infection may result if you neglect this. If there is delay in getting a doctor, the pain may be relieved by applying an ice bag or hot-water bottle.

Foreign Bodies

In the Ear—Children sometimes put buttons, beans, or other small objects into the ear. Always have a doctor remove them, unless they drop out readily. If an insect enters the ear, put a drop or two of castor oil or sweet oil into the ear and see a doctor. Do not try to remove wax from the ears by poking with sharp instruments, such as matches, toothpicks, or hairpins. If wax is troublesome, consult a doctor.

In the Eye—A cinder, particle of dirt, or other foreign body lodged on the surface of the eyeball or eyelid may cause great distress. The greatest care should be used in removing it.

Instruct the victim not to rub the eye. Have him close it gently, in the hope that the tears may wash the speck out, or into view, so that it can be removed with the corner of a clean handkerchief. If this does not work, flush the eye with clean water or boric acid solution from an eye dropper. If still unsuccessful, press the lower lid down and look for the speck. If it can be seen, remove it gently with the corner of a clean handkerchief. If the speck cannot be seen or is embedded in the upper eyelid or on the eyeball, consult a doctor. A little sterile olive oil, mineral oil, or castor oil dropped into the eye after a speck has been removed is soothing.

If the eye is wounded by a foreign body like a splinter of glass, metal or wood, or by a particle blown into it with great force, lightly bandage both eyes and get medical aid at once.

If acid, lime, or any other chemical enters the eye, immediately wash out the chemical then and there with great quantities of clean water. Do not use water if there has been any delay in giving first aid. Get medical aid at once.

In the Nose—Children may poke small objects up the nose as well as into the ears. If the object can be seen, it can usually be removed without much trouble, but if the first attempt is unsuccessful, see a doctor. The nose should not be blown forcibly.

In the Windpipe—See Choking.

Swallowed Articles—If a person has swallowed some sharp article, like a piece of broken glass or a pin, consult a doctor. Do not give a laxative.

Insect Bites

The bite or sting of such insects as bees, mosquitoes, flies, or spiders often causes swelling and inflammation. To relieve the discomfort, apply weak ammonia water or a paste of baking soda and water.

Nosebleed

Slight nosebleed does no harm and usually stops by itself. Pressing the nostrils together for four or five minutes may help. Do not blow the nose for a while after the bleeding stops.

If bleeding continues, call a doctor at once. While waiting for him, put the victim in a chair and loosen his collar. Apply cloths wrung out in cold water over his nose. It may also help to plug with a bit of cotton the nostril from which the blood is coming.

Always call a doctor for nosebleed in babies or old people.

Toothache

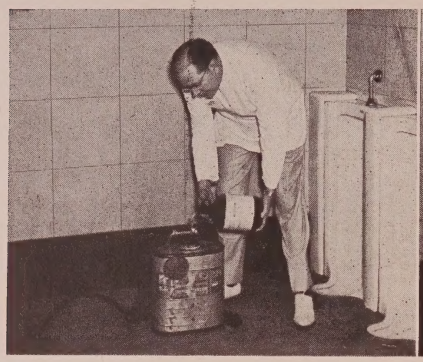
Go to your dentist as soon as possible. If a tooth starts aching at night or a dentist cannot be consulted immediately, the following measures may give temporary relief from pain. If there is a cavity in the tooth, pack it with a bit of cotton moistened with oil of cloves. If there is no cavity, apply heat or cold to the outside of the jaw.

FIRST AID SUPPLIES

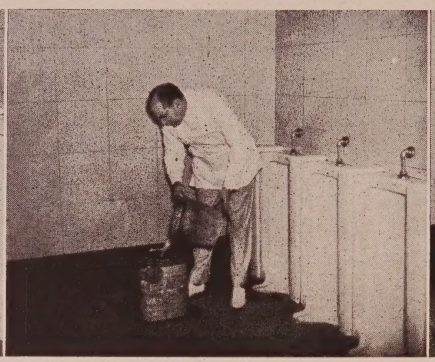
A metal cabinet, containing the following minimum equipment, placed in a conspicuous location and under the definite supervision of some member of the organization who has had first-aid training, is suggested.

- Individual package-type sterile dressings.
- Individual package-type finger dressings—1½-inch compresses.
- Individual package-type 3-inch compresses (also a few 4 by 6-inch).
- Assorted gauze roller bandages of various widths.
- Triangular bandages.
- Tourniquet.
- Scissors, pair.
- Absorbent cotton, package or roll.
- Splints of yucca or similar material.
- Aromatic spirits of ammonia, individual ampoules.
- Iodine, individual ampoules.
- Adhesive tape, safety pins, and any special equipment for the particular type of treatment found necessary in the theatre.

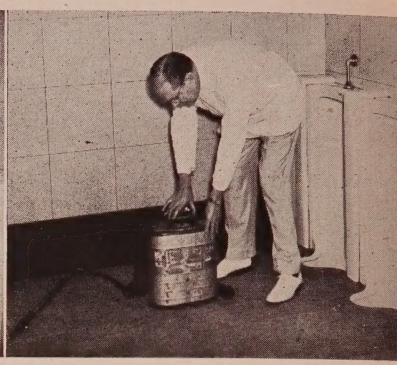
FORT-A-CIDE AGAINST ODORS AND DIS



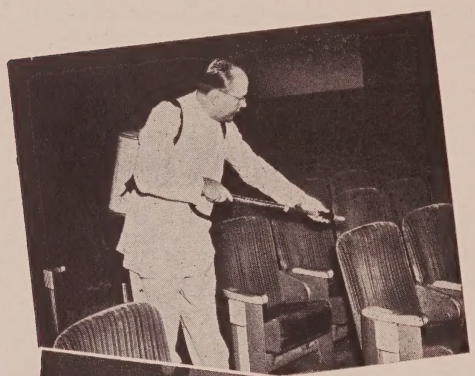
Pour One Quarter Gallon of Fort-A-Cide Odorless Solution into the "Indian" Tank

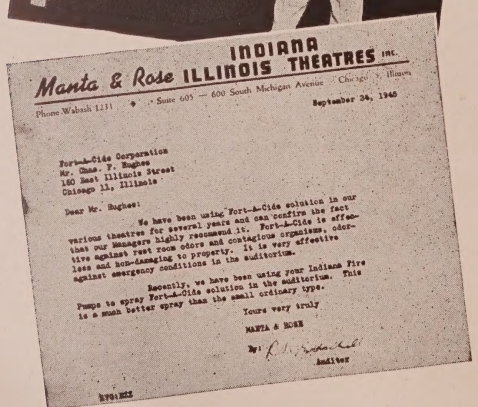


Add 2 Gallons of Plain Water (Hot or Cold)



Screw on Top Which is Fastened to Tank With Chain





INDIANA
Manta & Rose ILLINOIS THEATRES INC.
Phone Wabash 1231 • Suite 605 — 600 South Michigan Avenue Chicago 5, Illinois

September 24, 1945

Fort-A-Cide Corporation
Mr. Chas. P. Hughes
160 East Illinois Street
Chicago 11, Illinois

Dear Mr. Hughes:

We have been using Fort-A-Cide solution in our various theatres for several years and can confirm the fact that our Managers highly recommend it. Fort-A-Cide is effective against rest room odors and contagious organisms, odorless and non-damaging to property. It is very effective against emergency conditions in the auditorium.

Recently, we have been using your Indiana Fire Pumps to spray Fort-A-Cide solution in the auditorium. This is a much better spray than the small ordinary type.

Yours very truly

MANTA & ROSE

By: [signature]
Auditor

RYG:MZ

HOSPITAL-CLEAN REST ROOMS FOR FASTIDIOUS THEATRES...

ODORLESS DEODORIZING AND ANTI-INFECTIVE SOLUTION

DEODORIZES AS IT DISINFECTS . . . WITHOUT LEAVING MEDICAL OR GAUDY PERFUME ODOR, STAIN OR DAMAGE

USED BY BETTER CIRCUITS

including PARAMOUNT, BALABAN and KATZ, INTERSTATE, INTERMOUNTAIN, TRI-STATES, INDIANA-ILLINOIS, ETC.

"Simply add a cupful of Fort-A-Cide to a gallon of plain or soap cleaning water for mopping toilet floor (deodorizes and disinfects mop automatically), cleaning urinals, toilet seats and bowls and washstands. Fort-A-Cide attacks *the cause of odors* (bacteria) *without masking them with an equally irritating and property damaging chemical.* Leaves an INHIBITING RESIDUE on surfaces after the water evaporates that helps prevent odors and bacterial accumulations for 24 to 72 hours. ELIMINATES CLOGGING AND UNSIGHTLY URINAL BLOCKS. A MUST for upset stomach emergencies on seats and carpets. Non-damaging to cloth, leather and color."

JUST ONE OF THE SEVERAL INGREDIENTS IN FORT-A-CIDE ODORLESS SOLUTION HAS BEEN "BATTLE-TESTED". USED FOR PREVENTION OF FUNGUS AND MILDEW-PROOFING TENTS IN SOUTHWEST PACIFIC.

ECONOMICAL: One Gallon of Fort-A-Cide Odorless Solution at $5.00 Per Gallon Makes 10 Gallons of a Fort-A-Cide 1:10 Dilution at 50 Cents Per Gallon (this dilution is effective against bacterial odors and contagious organisms "on contact", according to hospital tests). PACKED MINIMUM 12 GALLON LABELED GLASS JUGS.

PRICE PER DOZEN $60.00

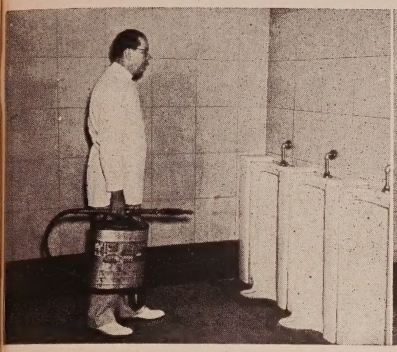
FREIGHT PAID EAST OF DENVER

Incidentally, enough Fort-A-Cide (1:10) to last 3 months used daily.

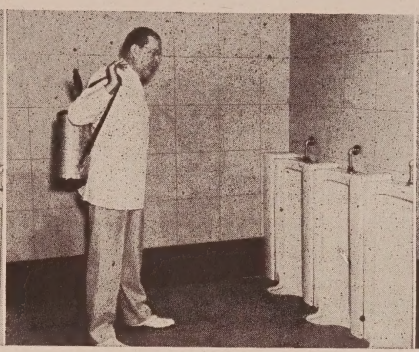
FORT-A-CIDE

CHARLES P. HUGHES, President • 160 EAST

EASE BROUGHT FROM FOREIGN LANDS!



Carry 2¼ Gallons of An Approximate 1:10 Dilution Easily by Handle



Slip Arms Through Straps and Sling On Back

Spray Urinal Walls and Plumbing With Solid Force Stream to Loosen Bacterial Deposits That Cause Acid Discolorations

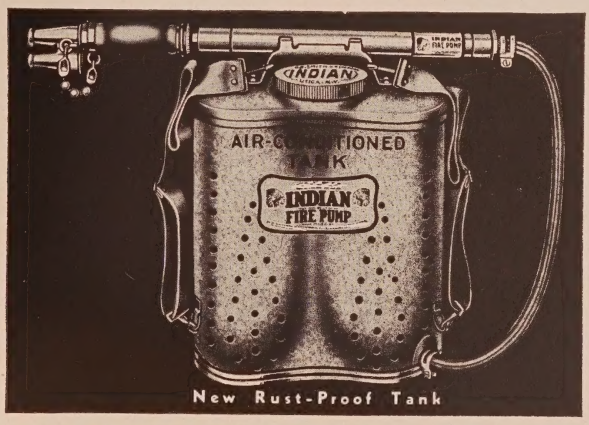
F O R T - A - C I D E F O R T - A - C I D E

THE "INDIAN" IS BACK

FROM THE WARS TO JOIN FORCES WITH "FORT-A-CIDE" IN "WORLD WAR III AGAINST DISEASE AND ODORS."

To insure protection of Porter in "disease danger zones" and consequent more efficient cleaning, use the "Indian" for "softening up operations" after a week-end by spraying plumbing *before cleaning* with a 1:10 Fort-A-Cide. Following this precaution, safely wash surfaces with sponge or rag soaked with a 1:10 Fort-A-Cide. Then, as a "clincher" for *microscopic cleanliness* and insurance against bacterial odors, spray the entire premises after cleaning with a "fog-mist" spray of 1:10 Fort A-Cide and let dry.

USE "INDIAN" FOR SPRAYING BETWEEN AUDITORIUM SEATS BEFORE SWEEPING AND FOR FOOT ODORS ON FLOORS

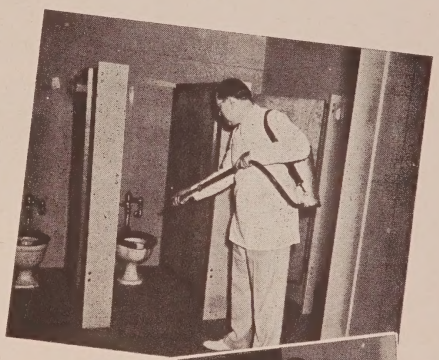


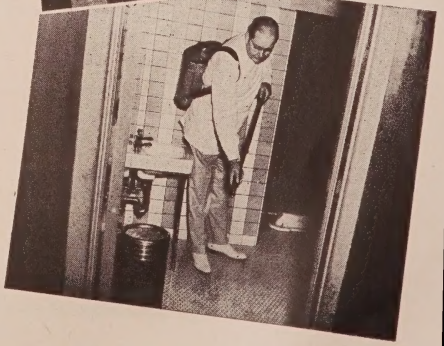
New Rust-Proof Tank

PRICE WITH SPECIAL NOZZLE $20.00, FREIGHT PAID EAST OF DENVER

"INDIAN," complete as illustrated with 5 gallon air-conditioned, galvanized steel tank, with adjustable 3 inch brass nozzle for either solid force stream or fog mist spray for air-borne rest room odors, wetting down dirt, debris between seats before brooming and spraying fabric or leather seats in auditorium. INVALUABLE IN CASE OF FIRE. USE THE DILUTED FORT-A-CIDE.

TO OPERATE: Simply pour in one-quarter gallon of the straight Fort-A-Cide Odorless Solution and add 2 gallons of plain, hot or cold, water (or use one-half gallon of solution and 4½ gallons of water. Tank holds 5 gallons). Slip arms through straps and carry on back. Work brass hand pump back and forth.





CORPORATION

ILLINOIS STREET, CHICAGO 11, ILLINOIS

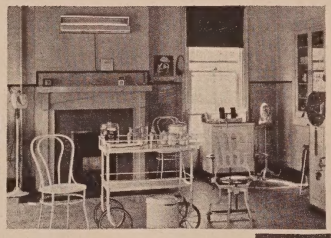
Safety . . . a vital consideration in postwar planning

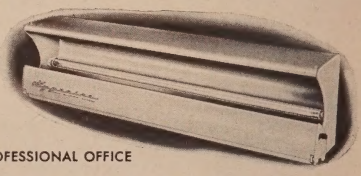
Youngsters, upon entering this modern classroom are now protected by the germ-killing ultraviolet potency of

HYGEAIRE UNITS

BEAR IN MIND that the health-conserving benefits of air sanitation are equally important right

down





PROFESSIONAL OFFICE

COMMERCIAL OFFICE

Insures the Rapid Destruction of Air-Borne Bacteria and Viruses

. . . at low cost

the

CAFETERIA

Their lethal efficiency in the zone of irradiation is effective at distances as great as 35 feet from the Unit . . . a comparative figure that suggests unprecedented economy in the number of Units required and low-cost operation.

Because of their small size and low visible light output, Hygeaire Units offer virtually no distractive influence.

Room occupants are constantly protected against direct exposure to the projected beam by means of a fixed baffle which confines the rays to an area above the line of vision.

Here is AIR SANITATION, at an operational cost averaging less than 3¢ a day per 1000 cubic feet of room volume.

line

● ● ● in fact, wherever people work or congregate within confined areas.

Ask your dealer or write us direct

AMERICAN STERILIZER COMPANY

Erie, Pennsylvania

DESIGNERS AND MANUFACTURERS OF SURGICAL STERILIZERS, TABLES AND LIGHTS

BOSTON WATER PURIFIER CO.

40 MURRAY STREET
NEW YORK, N. Y.

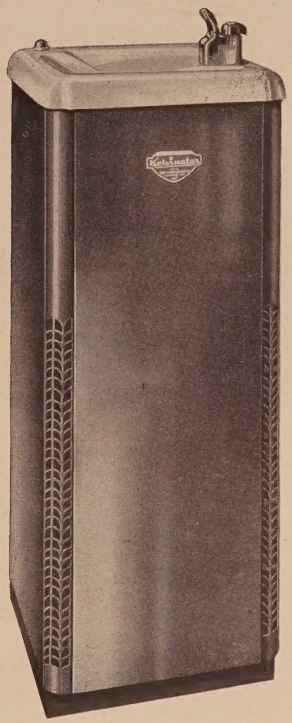
Featuring

Kelvinator

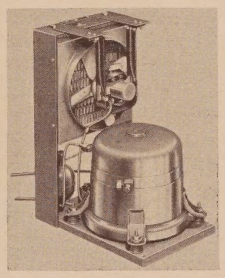
ELECTRIC WATER COOLERS

Nothing is more essential to the pleasure and comfort—for winning applause—of theatre-goers than adequate and conveniently located sources of fresh properly cooled drinking water. And to be in harmony with modern theatre fittings, these drinking facilities must be richly designed, adequate in capacity for heavy traffic, carefree and tamper-proof, and economical to operate . . . and above all, have an appearance that literally bespeaks sanitation. Kelvinator Refrigerated Electric Water Coolers in every respect meet these demands 100%.

True to the quality standards for which the Kelvinator name has long been known, these coolers insure twenty-four-hour-a-day delivery of properly cooled drinking water at the minimum cost of operation. Their modern walnut-bronze cabinet is topped with a gleaming, white porcelain top fitted with a sanitary, splash-free bubbler that is a source of satisfaction to all who use it. As to the cooling and operating mechanism of Kelvinator Refrigerated Electric Water Coolers one needs only to review the specifications listed below to realize their unexcelled quality, thoroughness of design and value for modern theatre use. Install Kelvinator Refrigerated Electric Water Coolers and have the satisfaction of knowing you have the best money can buy.



CAN BE USED FOR REMOTE INSTALLATIONS
Note: Even your own employees, from their improved efficiency and disposition will quickly convince you of the value of adequate Kelvinator cooled, refreshing drinking water.



FAMOUS CAREFREE KELVINATOR "SEALED IN STEEL" HERMETIC UNIT

The most efficient, carefree, condensing unit ever designed . . . with one of the finest service records of any unit ever used in refrigeration equipment. That's what the Kelvinator Hermetic Unit contributes to this water cooler. "Sealed In Steel" it eliminates gaskets, belts and service valves. Lubrication is positive. Unit charged with Freon non-toxic, odorless, non-inflammable refrigerant. Free from leakage, there is no loss of refrigerant. Operation is quiet and a minimum of current required. Thermal overload cut-out on starting relay safeguards motor against damage. From every standpoint the "Sealed In Steel" Condensing Unit combined with a sealed fan assembly provides carefree operation and efficiency at its best.

General Specifications

CABINET. Fabricated of heavy-gauge rust- and corrosion-resisting steel. Welded construction. Front panel removable for installation and service. Finish—Walnut Bronze lacquer over a baked enamel primer.

BASE. Heavy-gauge rust- and corrosion-resisting steel. Finish—Black baked enamel.

DIMENSIONS. Overall: 16″ wide, 16″ deep, 40″ high.

CAPACITY. 10 gallons per hour cooling from tap water temperature of 80° to drinking water temperature of 50°. Storage 4 quarts.

TOP. Overhanging type, white acid-resisting vitreous porcelain enamel. Anti-splash ridge integral with top. Equipped with metal perforated strainer.

BUBBLER VALVE. Combination self-closing lever type. The bubbler, self-closing valve, and automatic pressure regulator are combined in one unit. One piece chrome bubbler guard and valve shield.

GLASS FILLER OUTLET. Removable chrome cover cap provides for quick field installation of a glass filler on cooler top at left rear corner. Order glass filler from accessory list.

CUP DISPENSER MOUNTING. Two holes on right side panel near top for mounting any standard paper cup dispenser.

PRECOOLER. Freeflowing, efficient counterflow type. Inlet water flows through coil. Cold waste water precools warm inlet water, greatly increasing the capacity of the cooler.

INSULATION. Cooling unit and precooler compartment packed with ground cork and completely sealed in steel with hot hydrolene.

REFRIGERANT HEAT EXCHANGER. The hot liquid line is soldered to the cold suction line and coiled inside insulated compartment. Assures super-capacity performance and prevents slug-over of oil.

TEMPERATURE CONTROL. On and off adjustable Ranco Automatic Thermostat, maintains constant water temperature.

REFRIGERANT CONTROL. The flow of refrigerant is controlled by a restrictor tube and balanced by oversize refrigerant accumulator. Non-adjustable.

CONDENSING UNIT. Furnished only with Kelvinator sealed hermetic single-cylinder reciprocating 1/6 h.p. unit for use with 110 volt, 50 or 60 cycle, single-phase A.C. current only. Air-cooled condenser with sealed fan motor. Condensing unit cushioned and mounted rigid to cabinet base. Quiet, economical and efficient.

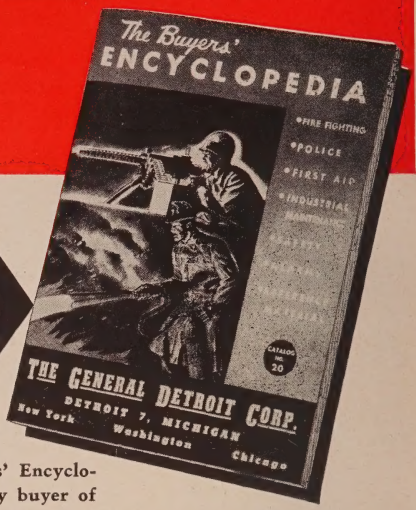
PLUMBING CONNECTION. Inlet size ⅜″ I. P. female. Remote bubbler connection ⅜″ I. P. female. Waste, 1¼″ I. P. female. All located in rear of cabinet. All connections rigidly fastened to cabinet with screws.

Specifications Subject To Change Without Notice

Here's why... IF IT'S **GENERAL** IT'S DEPENDABLE

General Detroit has been manufacturing high quality fire extinguishers and allied apparatus since 1905. Exclusive mass production methods and the "know-how" acquired over this long period of years are your guarantee of the finest in fire fighting equipment.

SEND FOR THIS FREE BOOK!



General Detroit's Buyers' Encyclopedia is a *must* for every buyer of theatrical safety, protective, and maintenance equipment. Its 48 pages are packed with over 500 different "hard-to-get" articles, all illustrated and described. Everything for fire fighting, first aid, building protection, safety, and theatrical maintenance. Signs, flashlights, hose, nozzles, and cabinets. Information on types of fires and how to fight them. Write for your free copy today! Address Dept. TC-45.

USE THESE FAMOUS FIRE FIGHTERS!

C-D/FOG Carbon Dioxide extinguisher. For electrical, chemical, gasoline, paint, and flammable liquid fires. Handy bracket for plant or office installation. Leaves no stain on clothing or premises. Underwriters' Classification: 15 lb. size, B-1, C-1. Also available in 2, 4, 7½, 10, 20, 50, 75, and 100 lb. sizes.

FLOAFOME 2½-Gallon Foam Type extinguisher. For gasoline, oil, paint, and chemical fires. Underwriters' Classification A-1, B-1.

RED STAR 2½-Gallon Soda-Acid extinguisher. For fires in wood, paper, textile, and rubbish. Sturdy copper construction with exclusive Sure Sweat seams. This is the fire fighter to hang in your lobby. Underwriters' Classification A-1.

S.O.S. FIRE GUARD Vaporizing Liquid extinguisher. 1 or 1½ quart handy size for car, truck, boat, plane, home, or office. Effective on electrical, gasoline, chemical, and flammable liquid fires. Patented Safety Phlare cylinder design insures *new* pump action at all times. Underwriters' Classification B-2, C-2.

PACEMAKER 5-Gallon Knapsack Fire Tank. Water pumped by telescopic action of nozzle-play pipe combination. Underwriters' Classification A-1.

ALASKAN 2½-Gallon and PROTECTOR 5-Gallon Pump Type extinguishers. Recommended substitutes for soda-acid extinguishers. May be used with anti-freeze charge. Underwriters' Classification A-1.

THE GENERAL DETROIT CORP.

2248 EAST JEFFERSON AVENUE • DETROIT 7, MICH.

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SECTION 3-F

REVENUE BOOSTERS

1945

Popcorn as Adjunct to Theatre Operation

A Brief Review of the Selling of Popcorn As Latest Revenue Booster for the Cinema

America is eating more popcorn today than at any time in its history. There are some, however, who are a little apprehensive about it all and declare that it is a fad which may not continue. When one considers that it is a rare individual indeed who does not care for it, it can be readily understood that the universal consumption the past few years is merely an expression on the part of the public to purchase something they like when given the opportunity to do so.

The sale of popcorn in theatres has become so widespread that patrons consider it essential to their enjoyment of the entertainment and, accordingly, it has recently become the most important side line of theatre operation. There are theatres, of course, in some areas of the United States which have been selling popcorn in the lobby for a number of years but for the most part, the practice is fairly new. Some theatres, of course, have still not adopted the practice. Even among old timers in the field, there are many problems which have a habit of bobbing up with greatest regularity.

Today theatre goers in most parts of the United States have come to regard the munching of popcorn while attending a movie as an important part of their evening's entertainment. In fact, some theatre owners who merchandise popcorn in their lobbies in the Middle-West, declare that some patrons actually attend a movie as a convenient place to sit and enjoy eating popcorn.

Most theatre owners upon merchandising popcorn for the first time have been pleasingly surprised at the tremendous volume sold and the subsequent profit to them. Although the practice is commonplace enough in most areas of the country, there are still many theatres who have not yet capitalized on this trend. Some theatre owners however, actually regard the popcorn-eating habit at theatres as the greatest opportunity to make their enterprise more profitable since the advent of the talking picture.

There is another point that should not be overlooked. An entirely new generation of popcorn eaters has grown up. Formerly it was only the children who bought popcorn. Not that the adults did not like it as well, but simply that children had less restraints on what was the "proper" thing to do. Today these kids have grown up and comprise the large group of adults who individually walk up to the popcorn stand and say "two please."

Theatre owners say that popcorn is, by all odds, their most profitable side line. One even remarked that he was coming to think of his business as a popcorn stand with a theatre in connection with it.

Consider this: The new hybrid popcorns have a popping expansion of more than 30 to 1. With good popping equipment, 100-pound sack of good popcorn will pop out more than $100 worth of corn. The total cost of the popcorn, popping oil, powdered seasoning, and bags (or boxes) is less than $28, leaving the theatre a gross $72. The average theatre can pop from five to ten sacks of corn a week, if it is merchandised properly; thereby grossing several hundred dollars a week extra.

Those who have already capitalized on this side line should study the set-up even deeper than heretofore. Perhaps by more skillful merchandising—whether it be better popcorn itself, improved lighting and display, or even the box you put it in—sales can be still further increased. Those who have not already made provision for selling popcorn might consider getting into it as quickly as possible. Popcorn eating is here to stay—and, incidentally, it is as distinctly American as the hot dog.

It should be mentioned that some theatre owners are not popping the corn in

THE CORN GROWS TALL FOR THE POPPING BUSINESS, as is manifest by this view of part of a National Popcorn Company field near Fremont, Nebraska. Popcorn is popularly supposed to grow only on small, more or less stunted stalks, but this 8-foot variety disproves the old idea. Other than increasing the height, modern agricultural research has given popcorn other augmented characters, such as a popping ratio of 30:1, instead of former 8:1.

their theatre lobbies at all. The corn is popped away from the theatre and delivered already boxed. It is then placed on trays over an oven. This keeps it warm and to some extent emits the appetizing popcorn aroma!

With the advent of new popcorn machines, improved hybrid popcorn, and new seasoning, most of the disadvantages of popping corn in theatres have entirely diminished and the all-important profit angle has greatly risen.

HANDLING GRAIN CORN

Proper merchandising of popcorn begins with the selection and storage of corn that will pop. Few customers have a taste for unpopped grains, commonly called hard tacks or old maids. Sales of half popped or half seasoned corn is not conducive to profitable business.

Assuming that all of the earlier-mentioned factors are adequately taken care of, there is then the very important matter of popcorn supplies. Many vendors have experienced difficulty during the past few years in finding acceptable popcorn. Much of the corn being sold today, varies markedly in moisture content which greatly affects its expansion. If the moisture is below 11 percent or above 14 percent, results will be unsatisfactory. If the corn is too dry, moisture must be added. This can be accomplished by spreading the corn out in a 3 to 4-inch layer, either on a clean floor or table, and sprinkle it with water. It should be stirred at intervals to facilitate uniform absorption of the moisture. It is also possible to sack the corn immediately after sprinkling. After a few days, the corn can be treated by popping a portion of it to determine if the moisture content is high enough for best results.

Properly processed corn for commercial popping is shipped with a moisture range of 13 to 14 per cent. It is necessary that the corn be stored in the theatre where it will not become excessively damp to increase the moisture, or where it could be subjected to heat to dry out the correct moisture. It is the explosion caused by the steam from the moisture in the kernel that causes the corn to pop.

If the moisture content of the corn is satisfactory at the time it is received, it is a relatively simple matter to hold it at that point. It should not be stored in a damp basement nor in a room that is too hot and dry. Theatre operators who use only a small supply of corn will find an ordinary oil drum which holds approximately 200 pounds and equipped with a tight lid, ideal for storing popcorn. The moisture content of the corn may be retained for a long period by this method and the corn is likewise protected against rodent damage.

Even among commercial users of popcorn, there are many misconceptions regarding the popping of corn for maximum results. There are some who still follow the practice of always "wetting" the corn a few days before popping. This may or may not improve the popability of the corn depending upon its original moisture content. If the corn originally contained more than 13.5 percent moisture, the addition of water would reduce rather than increase its popping expansion.

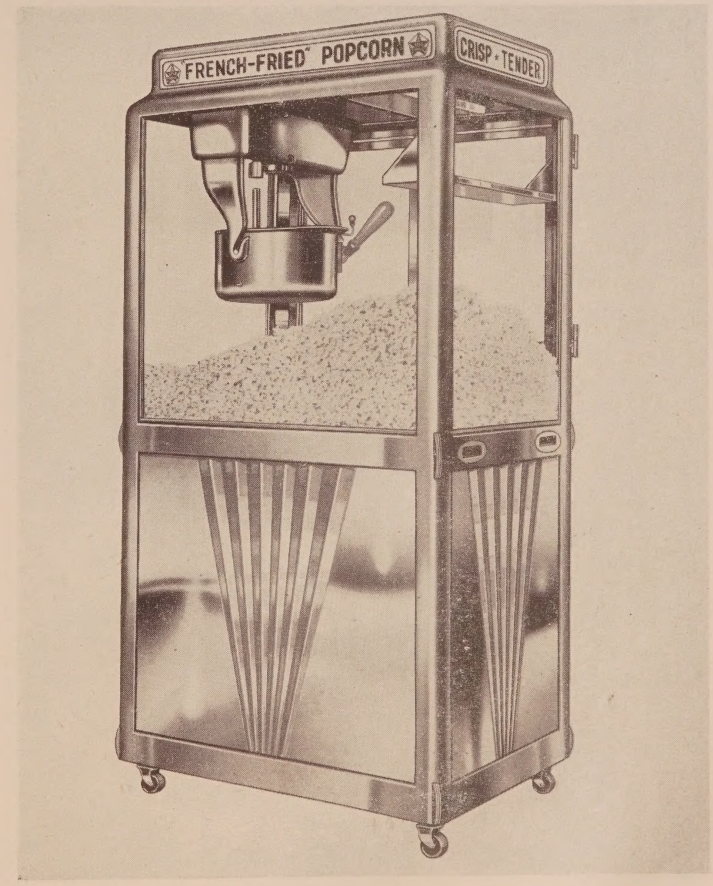
Some users feel that there is a relationship between temperature of the corn at the time of popping and the results obtained. In storing corn, temperature is, of course, important as it affects the drying out of the corn, but the temperature of the corn when placed in the popper, is in itself of little importance as far as popping results are concerned.

Frequently, the question is asked whether popcorn loses its quality with age. Contrary to popular belief, popcorn does not lose its popping expansion with age, but only through loss of moisture, or by insect or rodent damage or, perhaps, by mold, if kept too damp. Tests at Iowa State College at Ames, revealed that popcorn properly stored through a 14-year period, was found to have deteriorated only slightly in popping expansion. Corn held for five to six years may become slightly rancid or stale, however.

Aside from the moisture content of the corn at the time of popping, there are other factors which determine popping expansion. As already indicated, the temperature of the popper and the use of seasoning are factors. In addition, corn that has been bored into by weevils or damaged by rodents will not pop. The corn ear worm likewise destroys the germ end of the kernel and such damaged kernels do not pop. In addition, immature corn does not have the same expansion as well matured corn.

Another factor is the inherent ability of different varieties to expand. Normally an expansion of 21 to 1 is the standard of comparison. Some varieties exceed this standard while others do not. In recent years, the development of hybrid popcorn by various experimental stations, have greatly increased this ratio. Most notable of these hybrids have been developed at Purdue University and Kansas State Agricultural College. Some of these actually have an expansion ratio of 30 to 1. Theatres as well as other users of popcorn should be warned, however, that not all of the so-called hybrids, which are now appearing and will soon appear in every increasing amounts, are actually superior in popping expansion and quality. Generally speaking, however, users of popcorn can look forward to better results from popcorn hybrids

THE STAR MANUFACTURING COMPANY, INC., says of its Super-Star theatre model that it was designed to meet the needs and particular requirements of the theatre trade. It has a large capacity for the rush-hour business, it is easy to operate, and it is constructed to withstand years of continuous operation. Among the features of this theatre model, the company says, are the thermostatically controlled kettle and an automatic corn and oil feeder.



than with the older varieties of popcorn, especially when purchased from reliable sources of supply.

The Food and Drug Administration is very active in their inspection of popcorn in theatres. Improperly processed corn, or corn subjected to rodent infestation has been seized in a number of recent cases. It is recommended that the corn be stored in specially built bins—which can be obtained pre-fabricated or built by a good carpenter. If the storage requirements are for less than six or eight bags, steel drums are obtainable for the purpose. By the use of bins or drums for the storage of popcorn the moisture can be better controlled and it permits easier fumigation for protection against weevils and insects. All good popcorn is fumigated during the processing procedure—but frequently the popcorn can become infested while in transit and it is advisable to fumigate the corn as well as the storage room, bins, or drums, that will be used during the spring and summer months. A common fumigant for grain is carbon disulphide, a volatile, highly flammable liquid which, when mixed with air, is extremely explosive. However, handled with care and discretion, there is no danger. The usual dose is 1 pound of carbon disulphide for each 100 cubic feet of space in the fumigation chamber. To reduce the fire hazard, one part of carbon disulphide is sometimes diluted with four parts of carbon tetrachloride (better known as the non-flammable cleaning fluid, Carbona). When this mixture is used, the fumigation dose is five pounds to each 100 cubic feet, which, of course, is actually the same amount of the active ingredient.

THE POPPING BUSINESS

The popcorn machine and the popcorn that is placed in it are perhaps the two most important items for consideration, although others may, at times, be equally important.

The popcorn popper is in itself, a relatively simple piece of equipment and yet nothing is more aggravating to the vendor than to have the machine break down during a rush period. With many machines where the seasoning or oil is added to the popping unit, the addition of oil when too hot has caused very disagreeable burning odors. This may, of course, be due to (1) the machine itself getting too hot for best results and the subsequent burning of the oil and corn, (2) the seasoning being of low grade with too low a flash point, or, perhaps, (3) the inexperience of the machine operator

The use of a dry popper whereby the seasoning is added after the corn is popped, has gained favor with many theatre operators because it eliminates the chance of burning the oil during the popping process. However, there usually is less danger of scorching the corn or having the corn pop poorly if some oil is used to insure a more even distribution of heat around the kernels. The amount of seasoning added should be approximately 10 percent of the volume of the unpopped corn, although an excess of oil will do no harm so far as insuring maximum popping results is concerned. The addition of oil results in some increase in expansion and also reduces the time required for the kernels to pop. During rush periods, this advantage may offset any advantages that a dry popper might have. At any rate, it is essential that the popper be at the right temperature. If the corn is popped too slowly, some of the moisture will escape before popping begins and maximum popping expansion will not be obtained. Likewise, expansion may be low if the popper is too hot because the kernals scorch and do not become uniformly heated.

Selection of the popping oil or shortening is important. Some oils impart a very undesirable odor to the theatre, others impart a gummy film to the kettle which causes smoke. Properly selected oils will lend an appetizing aroma that will develop business.

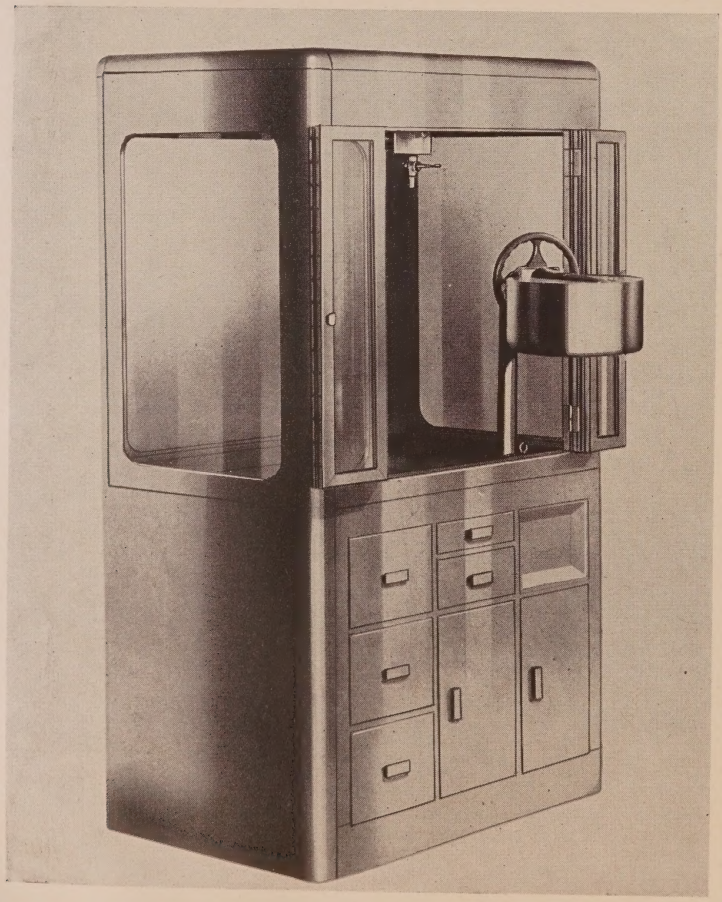
During the war period, most popcorn machine operators had difficulty in obtaining sufficient supplies of satisfactory seasoning or oil. Through necessity, much of their seasoning used was of low grade. There is still considerable difference of opinion regarding the best type of oil to use and again the best results obtained from any seasoning may depend to a large extent upon the temperature of the popping unit of the machine. There is still much research that needs to be done on this subject of seasoning and temperature for maximum popping results.

One of the objections theatres have to popping corn is, that it is greasy and does damage to the carpets, drapes, and seats. This objection has largely been overcome with the new powdered popcorn seasoning. With the use of this powdered seasoning in popping corn, it is necessary only to use enough popping oil or shortening to insure proper popping volume, the flavor and color being supplied by the seasoning. Thus, it is unnecessary to sell a greasy popcorn, to sell good popcorn.

Some vendors recommend the application of salt to the popper. If this is done, a very fine grade of salt is much more satisfactory than table salt, as it penetrates the popped kernel and seems to give it a better flavor.

The box or container in which the popcorn is placed is of great importance in popcorn sales. During rush periods, the speed with which the box can be filled

THE VIKING POPCORN MACHINES, INC., offers a Deluxe model for use in theatres. This machine is said to pop 16 ounces of corn in but 160 seconds, a rate which can be increased to meet peak demands. Among the features are, it is said, storage space for 50 pounds of corn and 2 gallons of pre-heated oil; a heating element which can be changed in 5 minutes; an automatic feed for full-kettle capacity; and inner kettle instantly removed for cleaning.



is essential. In addition, the amount of corn sold is usually calculated by counting the boxes. As a convenient method of recording sales, a serially numbered box has proven of great benefit in accounting popcorn sales.

In setting up the popcorn sales counter in the theatre lobby, convenience is of prime importance. It should, if possible, be so arranged that ingoing as well as outcoming patrons may readily see it and pass directly by it. Needless to say, such factors as lighting and the appearance of those in charge cannot be over-emphasized if maximum results are to be obtained.

In passing, it should be mentioned that, while many of the machines on the market are approved by underwriters laboratories, permission must be obtained from local authorities before the theatre operator may install any model in his theatre. It would be well—since some models are on the verboten list—for the prospective corn-popper to make inquiry as to whether his preferred model is on the approved list.

CARE OF POPCORN MACHINES

It is just as important to keep the popcorn machine itself spotlessly clean as it is necessary for the operator to be clean. Eye appeal is what sells popcorn. When the machine is closed for the night, do not leave popcorn strewn about on the bottom of the pan, but wipe out the bottom of the pan. Clean the interior of the machine with Bon Ami or soap, if necessary, to get the interior of the machine perfectly clean.

It is most important that the ceiling of the popcorn storage cabinet be cleaned daily. Remove all grease. If this is not done regularly, this grease accumulation becomes rancid, resulting in the popcorn's having a peculiar odor.

The daily cleaning of the kettle with a chemical kettle cleaner that will remove the daily accumulation of film will enable the kettle to pop better by removing a resistance to heat in the kettle. Since it is the film accumulated from popping in oil or shortening that causes the smoke —when good oils are used—the cleaning of the kettle daily will prevent the kettle smoke that is so undesirable. All that is necessary to clean the kettle is a little elbow grease and an inclination on the part of the operator to keep it clean. A stiff brush and a good strong soap will clean out the kettle any time, even when it becomes carbonized or black. Never use lye or any chemical which might disintegrate the aluminum. Never let water come in contact with the heating element. Where there is black in the kettle, use steel wool in the process of bringing the kettle back to original brightness. Never use a knife or steel tool in cleaning the kettle, as the steel will scar the kettle and make it harder to clean.

After emptying each batch of popcorn from the kettle, it is advisable to wipe the edge of the kettle with Kleenex to take off all the seasoning. If this is not done, the tendency is for the surplus seasoning on the edge of the kettle to run down and possibly cause the heating element to burn out.

Since it is not always possible to obtain the regular seasoning, greater care must be taken in keeping the equipment clean, especially where corn oil is being used. The steam from this type of seasoning condenses on the top of the machine, in the gears, in the motors, and leaves a gummy, resinous substance which should be removed daily to keep the machine in efficient operation. If this residue is left to remain on the equipment any length of time, you will find it impossible to remove it and the efficiency of the machines will be greatly reduced.

It is a good practice to oil the motor before each day's operation. The amount necessary is very small, in fact, a single drop is quite sufficient. This oil must be tasteless, otherwise it will spoil the corn, if it comes in contact with it. It is suggested that only mineral oil be used for this purpose.

In some machines there is a blower to take steam and the popcorn odor out of the kettle and the inside of the machine. Inasmuch as the steam that comes from the popping corn becomes saturated with oil, and this oil condenses in the machine, just over the popping kettle, you will notice a heavy machine screw with a washer just above it. By unscrewing this, you can drain the oil out of the blower through the valve. It should be taken care of daily, otherwise the fan of the blower may scatter some of the oil around the machine.

When you have the proper voltage and the line to your machine is not overloaded, the only possible chance of your kettle not properly heating would be in a loose connection to the machine. This often happens, and where the trouble like this is suspected, an electrician should be called at once.

Regardless of whether or not the line is loaded to capacity, it is a good idea to turn off the warming element when popping corn. This will save electricity as it is not necessary to use this warming element except when you are keeping the stored popcorn hot.

Never leave the kettle switch on when popping corn unless you are right at the machine and with seasoning left in the kettle and the lid open. The smoking of the seasoning will remind you that the switch is on.

DUNBAR AND COMPANY's Model 2240SS has an all-stainless-steel cabinet and is all-electric in operation. The popping pan is of nickel. This model, designed especially for retail stores and lobbies, is equipped, the company states, with the Popt-Rite rotary, dry, semi-automatic popper and buttering device. The model has a capacity of three-quarters of a bag for each popping. The company also makes equipment for off-the-premises popping.

For Sale: Frozen Foods in Theatre Lobbies

Vending Machines for Package Groceries Seen as New Management Service to Patrons

The housewife who attends a late matinee soon will be able to do her shopping for dinner right in the lobby of her favorite movie theatre, according to forecasts of authorities in the coin-vending-machine industry. On this page are the artist's sketches on how this vending equipment might be installed in theatre lobbies, and other places, such as apartment-house foyers and even other stores.

Reports to the Refrigeration Equipment Manufacturers Association from coin-machine producers disclose that new developments which may be expected before long include mechanically refrigerated machines for the vending of frozen fruits, vegetables and meats.

Other machines are being planned for the sale of delicatessen items, such as cold meats, potato salad, prepared salads, cheese, bakery specialties, and other foods, it was reported to REMA. Beverage dispensers, by the cup as well as by the bottle, are on their way to theatres, too!

Spokesmen for the coin-machine industry point out that frozen foods, because of their uniformity of packaging and keeping qualities, make ideal items.

Previous experiments with the sale of fresh foods through vending machines have proven unsuccessful, because of the difficulty in establishing uniformity in price and quality, and size in the case of fruits and vegetables. The danger of spoilage was another factor which prevented coin-machine operators from entering the food distribution field.

Developments in mechanical refrigeration, however, have opened a new market to the coin-machine operators, the industry authorities believe. With refrigerated machines, frozen fruits, vegetables and meats can be sold in standard-sized, convenient packages through machines in theatre lobbies, apartment building foyers and other places easily accessible to the public, they point out.

Other foods which require refrigeration to prevent spoilage also can be vended through machines as easily, as ice cream and beverages, two items which already are being widely distributed in refrigerated coin machines.

POPPERS BOY
PRODUCTS CO.

60 E. 13th STREET CHICAGO 5, ILL.

Suppliers of

SOUTH AMERICAN YELLOW HYBRID

POPCORN

GUARANTEED TO POP 27 TO 1 OR BETTER

SEASONING
SALT
BOXES — BAGS

★ *IMMEDIATE DELIVERY* ★

Distributors for

CRETORS

Corn Popping Machines for
Commercial and Retail Use

CRETORS — EST. 1885

THE PICTURE *is not complete*

without the new BERLO AUTOMATIC CANDY VENDOR....

There's a new Candy Cabinet coming! It's handsome . . . it's silent and slugproof. It has a greater capacity . . . shows a bigger selection . . . yet occupies a minimum of space. It is completely automatic. In short, it's revolutionary—and of course, it's BERLO!

AMERICA'S BEST CANDY

A·B·C

America's Best Candy . . . first in theatres (exclusively) . . . first in beauty . . . first in sales . . . will be first again with the best post-war model. When planning your post-war building or improvements, be sure to leave room (a few feet will be enough) for that profitable BERLO Built-In Candy Cabinet.

(Be sure to consult our technicians before completing your plans)

BERLO VENDING COMPANY

333 SOUTH BROAD ST., PHILADELPHIA

Branches In 20 Other Cities

What Popcorn Machine has EVERYTHING?

EASE OF OPERATION

ECONOMY
Pops corn cheaper

SAFETY
Better thermo-static control

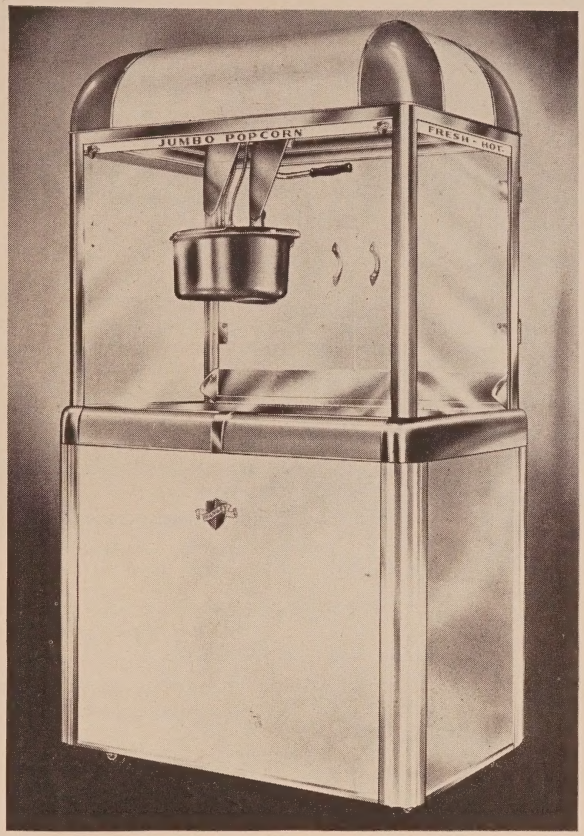
EASY TO HOUSEKEEP

FOOL-PROOF

CUSTOM-BUILT
To your lobby

GREATER KETTLE CAPACITY

FLOOD LIGHTED
Interior



MORE EYE APPEAL

LONG LIFE

GREATER CAPACITY
Pops corn faster

AUTO-GO THERMO-STATIC CONTROL

SEAS-O-MATIC
Seasoning ejector

SALT-O-METER

ELECTRIC WELDED
All aluminum frame

GREASE-PROOF
Insulation

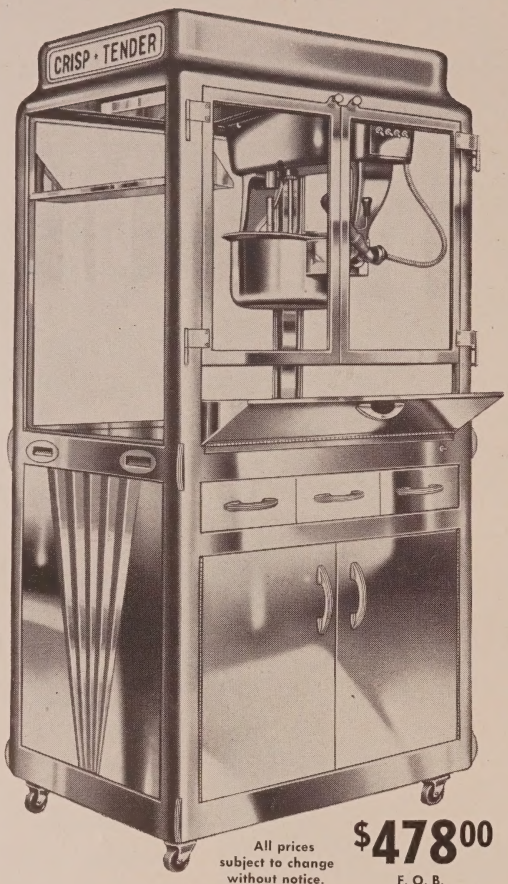
The New MLT-46 (Manley Lifetime Model!)

Manley Machines are the best again—and as they always have been—tops for showmen!

Manley, Inc.

1920 WYANDOTTE STREET, KANSAS CITY 8, MO.

Why Experiment? - - Insure Your Popcorn Profits



All prices subject to change without notice.

$478.00
F. O. B. St. Louis

WITH THE NEW POSTWAR "SUPER-STAR" THEATRE MODEL

Mr. Exhibitor, here is *your* popcorn machine — the machine that was designed especially to fill *your needs*, to meet *your particular requirements* of operating a popcorn machine in theatres. Huge capacity for those busy rush periods . . . simple to operate . . . extremely easy to clean . . . ruggedly built to stand up to years of continuous operation. And a stainless clad steel cabinet of enduring beauty.

THERMOSTATIC CONTROLLED KETTLES

Here's a new Star feature which in time will pay the entire cost of your machine in increased volume and savings in electricity. Thermostat keeps kettle from getting too hot. Adjustable dial — easy to operate—just set at correct temperature.

AUTOMATIC CORN AND OIL FEEDER

Another sensational new feature is the *Automatic Corn and Oil Feeder*. This marvelous device, available with the "SUPER-STAR," feeds just the *right* amount of corn and oil into the kettle by a flip of the lever. Increases capacity by saving operator's time.

$60.00 extra

Check These New Money Making Features

- √ Big Popping Capacity
- √ Rigid Construction
- √ Fool-Proof Popping Unit
- √ Stainless Clad Steel Cabinet
- √ New Gear Head Motor
- √ Easy to Clean
- √ Two-Heat Corn Warmer
- √ Replaceable Heating Element
- √ Extra Free Heating Element with Each Machine
- √ Eye Catching Beauty

A "SUPER-STAR" MEANS SUPER PROFITS

New money-making features to help you get the *most* out of your popcorn business. Extremely large popping capacity — over $20.00 per hour. Plenty of space for storing popped corn. Height 73½", length 36¾", width 27". Approximate net weight, 300 lbs.

FOR SMALLER THEATRES—THE "SILVER-STAR"

For locations where tremendous capacity is not needed there is the "SILVER-STAR," identical in construction and design to the "SUPER-STAR," except that it is smaller (and is not available with automatic corn feed).

$358.00
F.O.B. St. Louis

YOUR ASSURANCE OF QUALITY

Behind the Star "Pride Mark" is over 20 years' experience in building fine popcorn machines and in supplying parts and service to thousands of satisfied customers. Protect your investment — be sure with a Star.

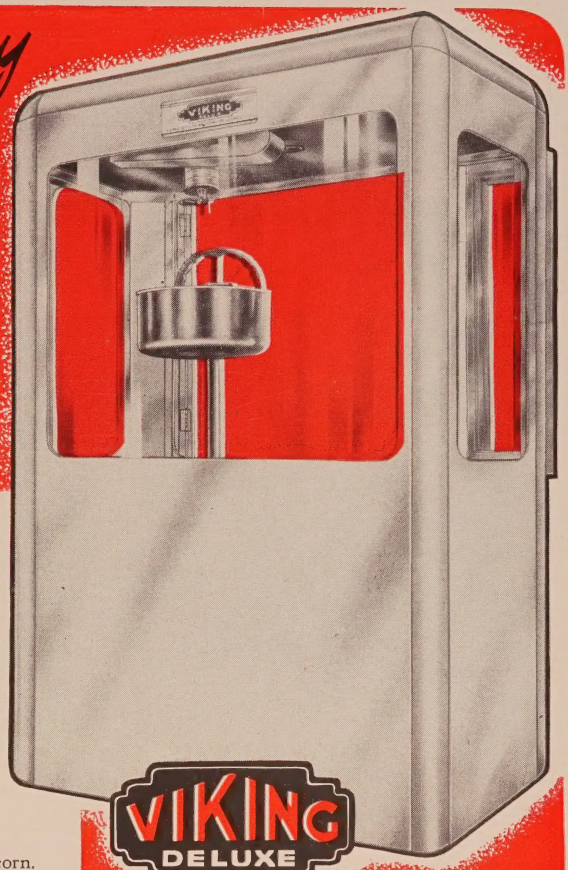
A STAR PRODUCT
PRIDE MARK
STAR MFG. CO. OF ST. LOUIS

STAR MFG. CO., INC.

6310 ST. LOUIS AVE.
ST. LOUIS 20, MO.

Make more money in Popcorn with a

VIKING POPCORN MACHINE



★ GREATER SALES-ATTRACTION

Draws business on sheer eye-appeal! Striking beauty combined with real dignity. Streamlined design, concealed wiring and inside fluorescent lighting. All-metal construction, cabinet of satin-finish stainless steel inside and out. Sanitary!

★ FASTER PRODUCTION

Pops a pint (16 ounces) of corn each popping. 'Round-the-clock tests day after day complete each 16-oz. popping in only 2 minutes and 20 seconds. Speedier output to meet peak demands.

★ MORE STORAGE

Ample capacity for 52 gallons or more of popped corn. 42-inch warming pan keeps it at full goodness, hot and crisp, for rapid selling at rush periods without waiting.

★ EASIER OPERATION

Automatic measuring of corn, salt and seasoning, all in 5 seconds. A child can handle it; every kettleful a success.

★ UNIFORM QUALITY

Pops to perfection every time because timing and temperature are under positive, trouble-free control.

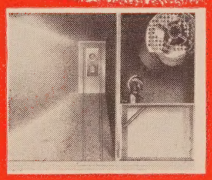
★ LESS UPKEEP

Sparkling, inviting cleanliness are easily maintained. All parts, including the kettle and blower fan, can be removed and replaced spotless in a few minutes.

★ SAFE, MORE ECONOMICAL

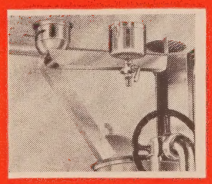
All-over insulation of kettle (swings out of the way while popping) protects operator. Kettle heating element can be changed in 5 minutes, hence no need to replace the whole kettle to renew the element.

VIKING DELUXE

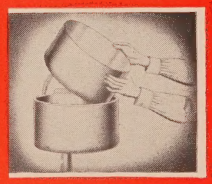


Ready storage for 50 lbs. of corn and 2 gals. of pre-heated oil.

Heating element can be changed in 5 minutes. Saves replacing kettle.



Automatic feed, correct amount of corn and oil for full kettle capacity.



Inner kettle instantly removable for cleaning.

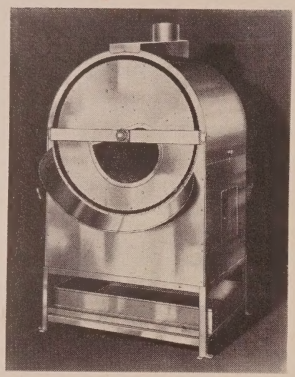
AND MANY OTHER GREAT FEATURES!

If a distributor for your film exchange territory is not listed below, one has probably been appointed since going to press. Contact the home office.

VIKING POPCORN MACHINES, INC., 1481 W. Washington Blvd., Los Angeles, Calif.

CHARLOTTE: Bryant Theatre Supply Co., 227 South Church Street ● **BOSTON:** Poppers Supply Co., 14 Piedmont Street ● **OMAHA:** Poppers Supply Co., 1520 Davenport Street ● **KANSAS CITY:** Poppers Supply Co., 116 West 18th Street ● **SAN FRANCISCO:** Poppers Supply Co., 105 Golden Gate Avenue ● **DALLAS:** Viking Distributors of Texas, 209 North Hawkins Street ● **DENVER:** Poppers Supply Co., 218 Boston Building ● **LOS ANGELES:** Poppers Supply Co., 2015 South Vermont Avenue ● **PHILADELPHIA:** Poppers Supply Co., 1315 Vine Street ● **SEATTLE:** Poppers Supply Co., 2224 Second Avenue ● **MINNEAPOLIS:** Poppers Supply Co., 31 Glenwood Avenue ● **DES MOINES:** Poppers Supply Co., 513 10th Street ● **OKLAHOMA CITY:** Poppers Supply Co., 606 West Grand ● **MEMPHIS:** Poppers Supply Co., 410 South 2nd Street ● **PORTLAND, ORE.:** Poppers Supply Co., 426 East Burnside ● **CINCINNATI:** Poppers Supply Co., 1635 Central Parkway ● **ATLANTA:** Distributor appointed; address to be announced soon ● **NEW ORLEANS:** Poppers Supply Co., 938 Gravier Street ● **TORONTO:** Canadian Automatic Confections, Ltd., 539 King St., West.

DUNBAR POPT-RITE POPCORN EQUIPMENT



MODEL 3036

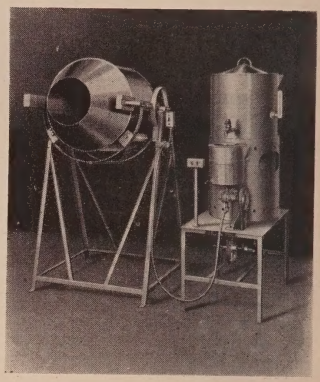
FOR CENTRALIZED POPPING

AT LEFT:

MODEL 3036 SUPER-GIANT SEMI-AUTOMATIC ROTARY DRY "POPT-RITE" POPPER. The universal popper suitable for the preparation of all types of popcorn. SIZE—6½' high by 4' sq. overall. CAPACITY—1200 lbs. to 1400 lbs. of popcorn per 8 hour day. (8-10 lbs. per popping.)

AT RIGHT:

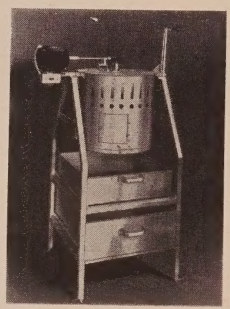
MODEL 350 M-T S. E. TUMBLING and SPRAYING EQUIPMENT. For applying seasoning or cheese coating to dry popped corn.
CAPACITY—1500 lbs. to 1800 lbs. per 8 hour day.



MODEL 350 M-T S.E.

AT RIGHT:

MODEL F. W. P. GIANT WET TYPE POPPER. The ORIGINAL complete floor type with sifting basket and waste drawer.
CAPACITY—400 lbs. to 500 lbs. per 8 hour day.

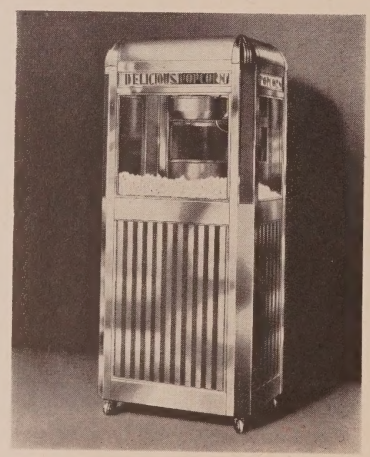


MODEL FWP

MANY OTHER MODELS

WRITE FOR COMPLETE CATALOG. We also supply accessories, scoops, salt shakers, caramel corn kettles and furnaces.

POPCORN CARTONS



MODEL 2230SS

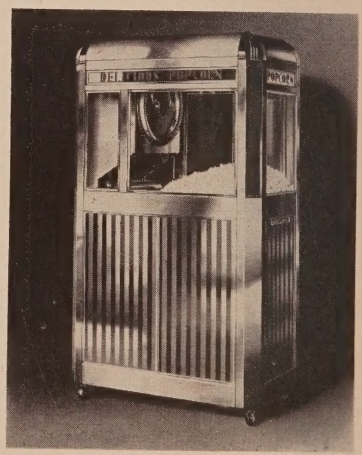
RETAIL STORE AND LOBBY MACHINES

AT LEFT:

MODEL 2230SS. ALL STAINLESS STEEL CABINET. All electric operation. Nickel popping pan.
CAPACITY—¾ lb. per popping.

AT RIGHT:

MODEL 2240SS. CABINET SAME AS 2230SS. Equipped with "Popt-Rite" rotary dry semi-automatic popper and buttering device. Gas fuel, electric power and warmer.
CAPACITY—¾ lbs. per popping.



MODEL 2240SS

DUNBAR & CO. 2652-58 WEST LAKE STREET, CHICAGO 12, ILLINOIS

ESTABLISHED 1900

THE COMPANY WITH A REPUTATION FOR GOOD, DEPENDABLE EQUIPMENT

Extra THEATRE PROFITS

with a *Columbus* EQUIPPED DEPARTMENT

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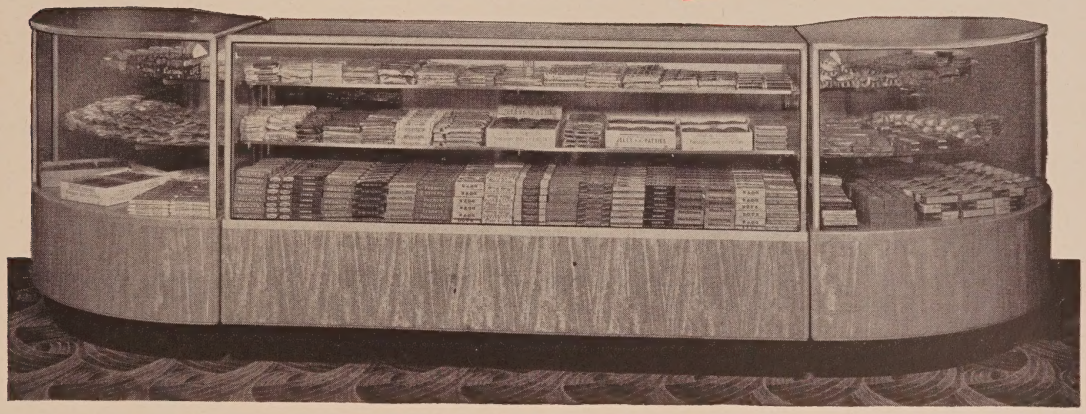

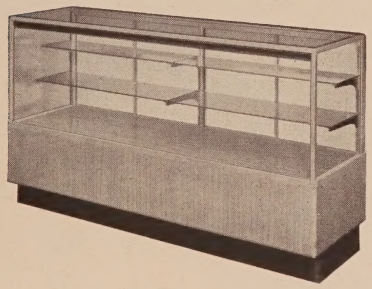

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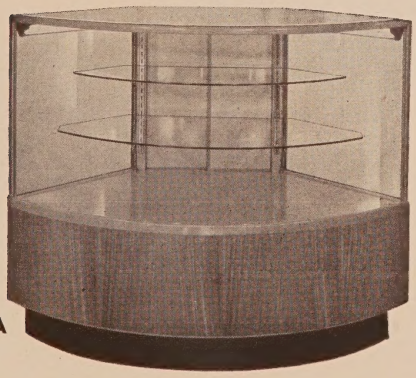

M-700-A

Turn a portion of your lobby or foyer — locations that are not paying their way — into profit-making areas with the installation of a Columbus equipped confections department. Many theatre owners report sales to as many as one-third of their patrons.

The sturdy construction of Columbus Cases of select cabinet wood and their scientific design make them a proud addition to any theatre. Two useful cases are illustrated. There are many others. Write for details.

THE *Columbus*
SHOW CASE CO.
850 W. Fifth Ave.
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A NEW STAR IS BORN

The Vendo Coin Changer is destined to receive "top billing" in theatres from coast to coast . . . building good will and plus profits by changing dimes and quarters into nickels where change is required for telephone or coin-controlled vending equipment. Write for illustrated brochure.

THE *Vendo* COIN CHANGER

THE *Vendo* COMPANY
KANSAS CITY, MISSOURI

SECTION 3 - G

PERSONNEL TRAINING

1945

A Training Course for Theatre Personnel

Home-Study for Would-Be Theatre Managers Covers Operation, Advertising, Projection

By DAVID M. BALTIMORE

President and Founder, Motion Picture Theatre Managers Institute, Inc.

In fifty years, the motion picture has advanced from a crude toy to the marvelous screen art and drama of today. Yet the motion picture is still in its growing stages. While it has progressed from a silent picture to the remarkable sound picture of the present day, its future possibilities are still unlimited. The popularity of motion pictures can readily be traced to the fact that the public needs relaxation and recreation from their daily problems. In the motion picture theatre, the public finds relaxation in the comforts and courteous service of luxurious surroundings; and, on the screen, it finds recreation amidst drama, romance, adventure, and comedy. At the theatre, it lives in a new world, leaving cares and worries temporarily behind.

The motion-picture business has grown and has prospered swiftly, because it has filled a need—that of good entertainment and at a price within the reach of the masses. Entertainment is the everyday necessity of modern life. The public needs entertainment and demands entertainment, and the motion picture screen is the medium through which the majority finds its entertainment.

The motion picture has brought to millions entertainment which was enjoyed at one time only by the few who lived in large metropolitan cities. Through the medium of the motion picture film, even the smallest towns may today enjoy the voice and picture of the greatest stage and screen stars. The big musical shows and the successful stage dramas of Broadway soon find themselves on the screen, shown on every Main Street theatre's screen throughout the land.

The motion-picture-theatre business has often been called the most fascinating business in the world today. That statement is a fact; it is the most fascinating business. It is a business that does not sell the same wares every day. It is business in which you are dealing with the likes and desires of the public, selling drama, romance, adventure, comedy, and so on. The picture of today will not be the picture of tomorrow. Every change of program brings new interests, new problems and new selling angles. No other business can have such fascination and such variety. It is a business that knows no monotony.

The motion-picture business has emerged from its days of infancy and has become one of the foremost industries of the present day. To produce, distribute, and exhibit motion pictures, 204,000 people are employed by the motion-picture industry. The salaries paid to the employes of the industry amount to $360,000,000 a year. In the amazing growth of the motion picture industry, no branch of it has shown greater progress than that of its theatres. In the United States, millions of people from all walks of life daily seek the entertainment of the motion-picture screen. The popularity of the motion pictures is not confined to certain places but to all sections of the world from the smallest of towns to the greatest of metropolitan cities.

The latest reports show that the average patron attends the cinema about thirty-two times a year and spends an average of about 27 cents for admission. According to the government figures, there are 17,920 theatres in the United States. Each year there are constructed hundreds of new theatres, de luxe, first-class theatres where trained men are needed. This, in itself, forms a big field of employment for specially trained theatre men. Today, the theatre business, with its beautiful and fine theatres, demands men who are trained for the management, advertising, and projection departments.

Harold B. Franklin, once in a book on motion picture theatres, wrote, "The demand for good managers will never cease. Bluntly, there is a shortage of the right kind of man-power in the field of theatre operation, and thoughtful executives are encouraging every effort to cultivate competent employes in keeping in pace with a demand that is ceaselessly expanding. To the new manager, or the man preparing himself for managership, I would say this: The future of the moving picture theatre will tend more and more to be put into hands of trained men, and those already engaged in the industry will go ahead or fall behind in measure as they train themselves."

Fortunes have been made in the motion-picture-theatre business. There will be more fortunes to be made in the future, as the possibilities for making money will be greater than ever before. Those who have the ambition and vision to train themselves in the theatre business will be among those who will benefit in the future.

TRAINING IN THEATRE BUSINESS

Training for the theatre business in the past was a long rocky road. Those who formerly desired to learn the theatre business had no means of securing systematic knowledge. To secure the theatre knowledge, it was necessary to start as an usher and continue for years in such capacity. It required long personal experience, and could only be secured in haphazard method, piecemeal, a little here and there.

This lack of systematic training has been overcome by the organization of a school of the theatre management. The faculty of the school has made a thorough study of means and methods for training and teaching men in the theatre business, and besides their many years of practical experience, have made a compilation of data and information for prospective theatre managers, assistant managers, projectionists, and advertising men as a vocation, and for those who desire to enter the motion picture theatre field as a business.

POSSIBILITIES FOR THE TRAINED

The motion-picture-theatre field offers large possibilities for men and women trained in the management and operation of theatres, with excellent opportunity for a good vocation and financial return.

Theatre Managers

Managing a moving-picture theatre of today is a highly desirable vocation. The field requires those who have been specially trained in modern theatre management, advertising, projection, and the development and presentation of entertainment, the selling of that entertainment, and theatre operation and maintenance.

Assistant Theatre Managers

The manager's understudy has an important position in the theatre, a position which is also full of variety, novelty and interest.

By preparation through systematic training, the assistant manager has excellent opportunities to advance. There is always a demand for assistant managers trained in modern theatre service, maintenance, and advertising.

Theatre Ownership

The money-making possibilities for one trained in the theatre business are unlimited. Actual ownership offers the greatest financial return. Theatres can be leased or purchased. The field is wide and varied. Cities and their suburban sections and the smaller towns offer good possibilities for building new theatres. Building up run-down theatres with modern showmanship is another excellent possibility. Hundreds and hundreds of present-day owners, starting in very

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minor positions, have gradually worked up to be owners of big successful theatres. The opportunities are today as great, if not greater, than ever before.

HOME STUDY

The home-study method of training is recognized as a new science of teaching and is considered a great educational movement of recent times. Seventy-three leading colleges and universities have home-study courses. The United States government has adopted the home-study method of training in much of its educational program in the Army and Navy.

There are thousands of men throughout the country who owe the foundation of their success to the fact that they had at one time studied home-study courses. Since the organization of motion picture home study, scores of letters attest the benefits of this type of instruction. Letters come from all classes of theatre men—from managers connected with large circuits, who were assistant managers—from men who have entered the theatre business, who report successful undertakings—from men who report doing better work and earning larger salaries—from men who were in very minor positions of the theatre—all of whom give credit to home-study training for their promotions to higher and more responsible positions.

The home-study method of instruction differs from the class-room in one major respect. In the class-room, the student hears the instructor lecture and makes notes accordingly, whereas in the home-study method, the student studies from the printed word the lecture or instructions. In the home-study training, the student studies in his spare time, retaining his employment, thus earning while he learns. Expenses of the training are reduced to a minimum. Tuition costs are high in resident or college training. Living costs and other expenses are also high. With home-study training, the student can progress as rapidly as his ability and time will permit. He is not held back by slow students nor is he rushed by over-anxious students. All the lesson text books and instruction material are applied in printed form. Some people find it difficult to learn as quickly by hearing as by seeing. Most people remember more readily what they read than what they hear. This is an important point in home-study instruction.

TYPICAL HOME-STUDY CURRICULUM

The typical course of training, like that offered by the Moving Picture Theatre Managers Institute, Inc., is composed of 40 lessons. The following brief descriptions of the subject matter of the course are in three broad divisions of the theatre business—theatre management, advertising, and projection.

Theatre Management

The division of theatre management is composed of 19 lessons on organization and operation, the buying, development, and presentation of screen entertainment, and the handling of the personnel. This training in every phase of modern theatre management equips the student for executive duties in all classes of theatres.

History of Motion Pictures—The background of the motion picture industry is studied from a technical and business viewpoint as a foundation for what is to follow.

Theatre Organization—In this lesson is told how to organize a theatre, from a moderate-sized to a large de luxe house. Also is given a preliminary survey of the problems and principles of each of the departments of a modern theatre and how systematically and efficiently to organize the entertainment, service advertising, and departments of the theatre.

Theatre Staff and Service, Part 1—This lesson tells how to organize, select, train, direct, and supervise the personnel of the service department, including such subjects as how to handle patrons, how to make and use service manuals, and how to train the staff in courtesy and service. The instructions and rules are given and are adaptable to theatres of all sizes. Detailed information for building up a strong and loyal service personnel is included, the duties and training of the cashier, doorman, and footman are recounted.

Theatre Staff and Service, Part 2—A complete knowledge of the training and duties of the head of the service department and the ushering staff is given. The different charts, reports, and forms used in the theatre's service department are illustrated.

Theatre Staff and Service, Part 3—How to organize the cleaning and maintenance departments the duties of the superintendent, janitor, housekeeper, porters and cleaners; theatre cleaning suggestions; and plans and suggestions for the proper maintenance of the theatre building, equipment and machinery are presented.

Production—In a brief consideration of Hollywood is given what a manager should know, of how pictures are produced, from the raw product to the finished negative. Among the topics covered are producers and their product; types of features; program pictures, special pictures and big special pictures, classification of pictures, story material, technical men, and screen stars and their classifications.

Distribution—Distribution shows how pictures are rented, with a complete analysis of the system. Among the subjects are distribution organization, exchange centers, classification of exchanges, exchange branch organization, exchange sales department, determining national sales quota, film salesmen, buying pictures, analysis of buying factors, runs, contracts, analysis of the contract, exchange service, booking, and the inspection, shipping, and accounting departments.

Program Building—Because program building is so important in the success of the show, an attempt is made to develop the ability to arrange and schedule screen, stage, and musical entertainment, so that the program will be presented in an entertaining and interesting manner and at the same time be properly balanced. Among the subjects are standard programs, types of programs, program lengths, program balance, program schedules, and schedule making.

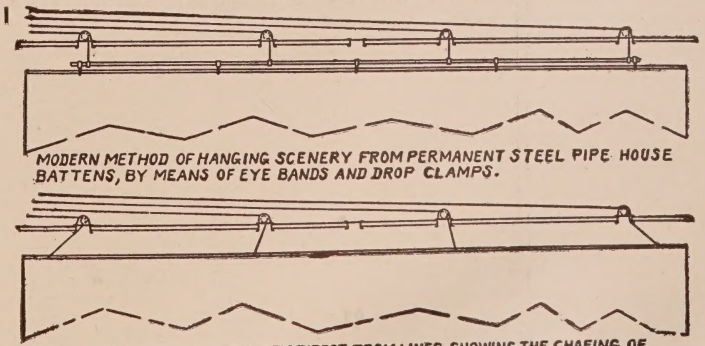
Theatre Bookkeeping—Instruction on the application of the fundamental principles of bookkeeping is presented through such subjects as daily box-office statements, weekly reports and statements; film rental, film transportation, stage entertainment expenses, payrolls, advertising expenses, miscellaneous expenses, supplies, repairs and renewals; insurance; depreciation, and petty cash accounts.

Theatre Law—The legal questions, arising in the every-day problems of managing a theatre, include licensing, public health, safety and morality laws, regulation of theatre operation, admission prices and tickets; ejection; injury of patrons, and employe relations.

Building Matinee Business—How to increase box-office receipts by means of special matinee stunts is told through many practical suggestions.

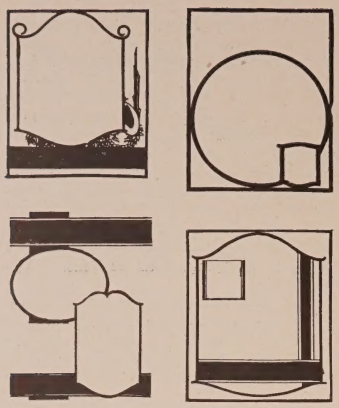
Theatre Design—The object here is not to supplant the architect, but to give the theatre manager a broad knowledge of the modern theatre and its design and an understanding of the constructional features from an operational standpoint.

COMPARISON OF CURTAIN-HANGING METHODS are taught by such diagrams as this. The modern method of hanging scenery from permanent steel-pipe house battens by means of eye bands and drop clamps is shown at the top, while the old method of hanging scenery directly from lines is shown below. The latter drawing also shows the chafing of the rope in beams. It is from such illustrations that the student learns the latest and best.



MODERN METHOD OF HANGING SCENERY FROM PERMANENT STEEL PIPE HOUSE BATTENS, BY MEANS OF EYE BANDS AND DROP CLAMPS.

OLD METHOD OF HANGING SCENERY DIRECT FROM LINES, SHOWING THE CHAFING OF ROPES ON BEAMS.



USE OF ARTISTIC PANELS in advertising lay-out is taught through the study of such designs as these. With such hand drawn displays, it is sometimes easier to fit the picture's mood to the theatre's.

Among the subjects studied are how to select theatre locations and sites, theatres and commercial buildings, the advantages and disadvantages of various theatre types, how to plan a theatre, how to determine floor pitches, what sight lines are and how to lay them out for the best viewing of the stage and screen.

Theatre Construction Regulation—How to make a theatre safe and comfortable—what to do and what not to do—gives information on how to arrange seats, how to determine capacity, and many other subjects.

Projection Room Design—The well designed and located projection room is studied from the standpoint of how to determine the best location, how to design the room, and how to determine the size. Also in this lesson are covered projection equipment, screens, how to select best equipment for a particular situation.

Stage Design—Going back of the scenes in the design and layout of the stage, such subjects as proscenium curtains, stage blocks, and counterweight sytems are considered. Also studied are stage lighting and its control, color circuits, types of footlights and borders, switchboards, and dimmers.

Theatre Lighting, Part 1—To learn the principles of making theatres artistic and enhancing beauty and entertainment values are studied, such subjects as how to measure light and its units, how to light an auditorium for general illumination and for decoration, how to secure atmospheric effects, how attractively to light lobbies, rest-rooms and other parts of the theatre, how to use seasonal lighting, how to light the orchestra, and how attractively and effectively to illuminate theatre exterior.

Theatre Lighting, Part 2—The different lamp types used in the theatre are discussed, along with their advantages and disadvantages. The different mediums are studied for the various uses. Considered also is how to select the most effective electric signs for the different classes of theatres, and how to operate and maintain them.

Theatre Ventilation—Various ventilating systems and their methods of operation are studied, as are the principles of making a theatre inviting and comfortable at all seasons.

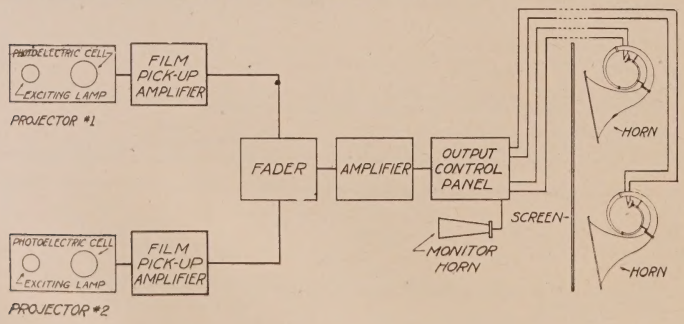
Theatre Advertising

Advertising is a very important branch of the theatre business. The success of many theatres has been traced to well directed and arranged advertising by a trained advertising man. Theatre advertising comprises the subjects of newspaper advertising, theatre programs, lobby display design, and exploitation. The lessons cover all phases of theatre publicity.

Theatre Advertising Principles—The fundamentals of theatre advertising give the background upon which all theatre advertising is based. Shown systematically is the how and why of selling entertainment, the fundamentals of advertising, the requirements for effective advertising, various mediums, the theatre's message, sources of information, functions of advertising, fundamentals of attracting attention, and selling points.

How to Use Type—A knowledge of type, so that the theatre message will be placed effectively before the public, is gained through a study of the classes of type, how type is measured, and how to tell type faces suitable for theatre advertising.

SCHEMATIC DRAWINGS, such as this one of a theatre sound system, present to the student graphically the order of processes and the placement of equipment. Thus it is seen how, from the exciting lamp and photo-electric cell, the sound goes through the film pick-up and amplifier, then through the fader, amplifier, output control panel (to which a monitor speaker for checking purposes can be attached), and finally to the horns in back of the screen.



HAND-DRAWN ADVERTISEMENTS, such as the portion shown here, are studied by the students for a better understanding of fitting the lay-out to the picture to get the best return for the newspaper space bought.

Theatre Illustrations, Cuts, and Borders—A complete understanding of illustrations suitable for theatre advertising and the photo-engraving processes is given in order to understand how to order and use engravings. Among the subjects considered are uses of illustrations in attracting attention, selling entertainment, and selling institutional features, photo-engraving processes, line cuts, classes of drawings for line cuts, halftone and combination cuts, determining cut sizes from illustrations; electrotypes, mats and stereotypes, plain and ornamental borders.

Layout Mechanics—How to make and arrange advertising layouts to attract attention are considered from such subjects as elements of display, arranging type and illustrations, layout material and size, layout directions for designating the border, headlines, and body matter, and making the layout and proofreading.

Theatre Advertising Copy, Part 1—Instruction is given on how to develop attention-compelling copy to sell theatre entertainment. A complete study of theatre copy is made, with such subjects as elements of copy, headlines and their selection, catchlines of all kinds.

Theatre Advertising Copy, Part 2—Subjects here include subheadings, supporting cast names, credit lines, play dates, schedules, admission prices, short subjects, stage attractions, music, slogans; summer and success advertising, body-matter copy for all occasions.

Newspaper Display Arrangement, Part 1—Through this subject is shown how to attract attention with type and how, with proper and effective arrangement, an advertisement can be emphasized and made to sell. The subjects covered include emphasis, capitals, italics, underscore rules, headline display arrangement, headings of various styles, headline type sizes, white space around headlines, letter spacing in headlines, minor headline words, and catchline display.

Newspaper Display Arrangement, Part 2—Subjects included are theatre name locations, displaying supporting cast names and play dates, panels, displaying schedules and short subjects, and stage units, displaying the slogan; displaying the body matter, odd body-matter shapes, and subheading display suggestions.

Newspaper Display Arrangement, Part 3—Subjects are arranging the display elements, composition in the layout, how to balance the display, attention attract-

ors, white space, contrasts, hand-drawn borders, border suggestions, and art panels.

Newspaper Display Arrangement, Part 4—Subjects include advertisements made from rules, diagonal layouts, hand-drawn advertisements, strong advertisements, dark and reverse advertisements, advertisements made from stills, and campaigns.

Theatre Programs—How to layout and prepare interesting copy for theatre programs is told through a consideration of types of programs, planning the programs, pages, paper, issues, program names, covers, front and inside pages; illustrations, article headlines, body-matter suggestions, dummies, advertising, and distribution.

Lobby Display Design, Part 1—Full information is given on lobby displays and their design. Instruction is given on how to secure attractive effects that will catch and hold the eye of the passerby. Among the subjects are how to use standard lobby material effectively, lobby cutout design and construction, shadow box design, transparencies, display cards and their design, layout and copy, art frames and artistic displays, and banner.

Lobby Display Design, Part 2—Subjects include animated displays, electrical displays, design and construction, built-in displays, and holiday displays.

Exploitation — Exploitation mediums which are moneymaking ideas of the theatre are studied in a consideration of many practical exploitation ideas of proved worth.

Projection

It is upon the proper projection that the success of the screen entertainment depends, so the manager-to-be is given instruction on how to secure and maintain a good screen picture.

Projection, Part 1 (Projection Principles)—Subjects include the motion-picture film, the camera, how motion pictures are possible, the projector, and intermittent movements.

Projection, Part 2 (Projector Mechanism)—Subjects are shutters, travel ghost, flicker, the aperture plate and film gate, safety shutters, sprockets, threading, reels, rewinding, film magazines, framing devices, speed control, film splicing, and film damage.

Projection Part 3 (Projection Electricity)—Because projection apparatus is operated by electricity, knowledge of this subject is given.

Projection Part 4 (Projector Lenses)—Subjects include types of lenses, lens troubles and their correction, objective lenses, lens sizes, size of screen image, condensers, condenser breakage, and care of lenses.

Projection Part 5 (The Projector Arc Lamps)—Subjects are the carbon arc and types, carbon and its properties, projector carbons, low-intensity lamps, reflector lamps, and high-intensity lamps.

Projection Part 6 (Arc Lamp Current Control) — Subjects cover rheostats, transformers, motor generators, circuit, motor generator troubles.

Projection Part 7 (Sound Pictures)—Subjects include principles of the reproduction of sound, sound-on-film reproduction, film reproducing units, exciter lamps, photoelectric cells, amplifiers, vacuum tubes as amplifiers and rectifiers, gain amplifiers, power amplifiers, faders, speed control for sound systems, horns and receivers, monitor horns, non-synchronous sound systems and screens for sound pictures.

Learning While Working Keeps Staff Alert

Theatres Can Promote Efficient Operation By Instruction at Regular Staff Meetings

By TONY PELUSO

Manager, Fanchon and Marco Fox Theatre, Saint Louis

For fully the past four years the major problem at Fanchon and Marco-Saint Louis Amusement Company Theatres, operating twenty-eight neighborhood and five first run houses in greater Saint Louis, has not been one of a continuous course of training for theatre personnel, but rather one of finding continuous personnel capable of being trained.

Fanchon and Marco, under the direction of Harry C. Arthur, Jr., has, during its entire history, maintained constant training courses for both new and veteran employes, in order that at all times every person employed might be kept up to the minute in every phase of theatre operation. Special stress has been laid, of course, during the past four years, on one of the most all-inclusive training courses of any chain of operation throughout the country.

First and foremost among the points stressed to new employes in the course of training for theatre personnel is the fact that a majority of the executives employed today in all departments have "come up through the ranks." This immediately instills in any person, regardless of his first position with the company, a sincere desire to do his job well, for he knows from the very start that if he can produce he can succeed. Boys who apply for jobs as ushers are never hired if their ambition in life is to be an usher, but for each and every man who shows initiative and ability the knowledge that better jobs go to men in the ranks instills an honest desire to do a good job.

One of the most important phases of this training was a 13-week school instituted for the purpose of training wives of managers to take over managerial positions should their husbands be called to the Armed Forces. Twenty-eight women availed themselves of the opportunity and twenty accepted positions. Ten are still working, awaiting their husbands' return, when they will retire and their husbands will take over. This has eliminated the necessity for layoffs with men returning, and meant good income for wives and children while the husbands were serving.

In the spring of 1944, in cooperation with the Public Schools system in the state of Missouri, a special 12-hour course in "How to Teach an Employe" was made available to theatre executive personnel, who took the course better to fit themselves in the handling of constant turnover.

Weekly meetings are held in individual theatres throughout the circuit, covering every phase of theatre operation.

Staff meetings of ushers are held under the direction of the theatre manager, with assistant managers, chiefs of service, and captains attending to direct the schooling of ushers.

Weekly meetings are held with the entire staff at which fire drill and panic control are the main topics of discussion, and proper actions are continuously drilled into staff minds so that, in the event of any disaster, the staff will automatically react to the best interest of patron and company safety.

Weekly meetings are held with treasurers and cashiers, with proper handling of patrons stressed to bring to a minimum difficulties from this highly important angle of operation.

The staff of cleaners is called into a weekly session, at which time the manager and the head cleaner go over problems of this phase of operation, stressing to the staff the importance of this job.

A special service-staff manual is in the hands of the chief of service, and every new usher is given full and complete instructions in how to handle himself and his patrons. All ushers sit in on these meetings, which means that there is a constant review and renewal in every mind of what is expected of every man on the floor, and what his conduct when not in service should be.

In this way, a constant and continuous course of up-to-the-minute instruction and training for all personnel is maintained.

The Duties of Personnel in Case of Fire

Organization and Responsibility of Staff Is Essential for Meeting All Emergencies

By Safety Research Institute

Personnel training is as important as proper construction and equipment in keeping theatres safe from fire and panic.

Training of personnel for the event of fire should equip them to:

(1) Notify proper authorities.

(2) Make use of safety equipment, such as proscenium walls, fire doors, and fire extinguishers.

(3) Empty the theatre quickly.

(4) Prevent panic.

The organization of the staff to carry out these functions will vary with the size of the theatre and the available manpower. Without adequate manpower, of course, adequate coverage is not possible. A thoroughly ushered theatre, in the opinion of Chief Michael J. O'Donohue, in charge of Public Assembly in the New York Fire Department, is an excellent defense against panic. Nevertheless, even with a small staff, proper planning can make effective use of the personnel available.

In small theatres, it is most practical to consider the entire staff as one unit. In large theatres, it is frequently useful to divide the personnel according to areas, such as the balcony, stage, etc.

Regardless of the type of organization, each member of the staff should be assigned some specific duty in the theatre (or in his area of the theatre). But, in order to maintain flexibility and to ensure smooth performance, it is advisable, wherever possible, to give each man training in every aspect of the program. Each man should know how to turn in an alarm, man an evacuation post, close the fire doors, and use extinguishers.

The training of the staff may be quite elaborate in large theatres, or may take the form of simple weekly meetings in smaller theatres. In any event training should be continuous and regular, and should include practice fire drills, simulating actual conditions.

Properly planned lectures and demonstrations should give personnel an opportunity actually to handle extinguishers during fire drills. The local fire department and the National Fire Protection Association can give valuable help to the manager in organizing such a program and teaching the proper use of extinguishers. In some theatres, former professional firemen are employed for this purpose. With proper training, even young ushers and usherettes can use equipment successfully. In theatres where extinguishers have been promptly put to use, a large number of fires have been put out with trifling loss.

NOTIFYING THE AUTHORITIES

The manager, chief usher, or person in charge in an emergency should always be readily available. Either he, or someone delegated by him, should be in the theatre at all times, at some spot where he can be reached at once, and, in turn, can contact the rest of his staff.

The person who discovers a fire should notify the manager at once, and then the fire department. Or, the manager may prefer to be the one responsible for notifying the fire department. In either case, as soon as a fire is discovered, whatever its size, the fire department should be notified immediately. This may be merely a precautionary measure in most cases, but it should never be omitted. Even if a fire has been extinguished by the theatre personnel, the fire department should check to see that there is no danger of reignition.

The signaling system is a very important factor in the prompt reporting of fires. Automatic fire alarm signals, either electrical or mechanical, are recommended by the National Fire Protection Association, and may be practical in large theatres. Any automatic system installed should carry the approval of the Underwriters' Laboratories, and, to assure operation when needed, it should be inspected regularly. It should be arranged so that the alarm is given in the manager's office or at some observation post where a watcher is constantly stationed. It is understood, of course, that these alarms are to be indications of fire only to the manager and his staff. The audience should never be subjected to a perceptible alarm system.

In small theatres, where automatic alarms are not practical, some other rapid but quiet signaling system should be used, with a minimum of motion to disturb the audience. Where an automatic sprinkler system or other extinguishing apparatus is installed, it may be connected to the alarm system, so that the manager will be warned when these extinguishing systems are set off by fire.

It is advisable to have a direct connection to the fire department as part of the alarm system. If this is not possible, instructions for calling the fire department should be an important part of the training program. Wherever practical, the nearest city fire alarm box should be used, and the employe should remain by the box until firemen arrive. If it is necessary to use the phone for notifying the fire department, clear instructions should be posted near all telephones.

USING FIRE EQUIPMENT

While one employe is notifying the proper authorities, another should be able to attack the fire with an extinguisher or other appropriate equipment.

Depending upon where the fire has started, other protective equipment, such as the asbestos curtain, fire doors, etc., may be called into action.

If the fire has started in the projection booth, a special situation develops. Because more than half of our theatre fires begin in projection rooms, they are now constructed so that fire will be confined within the room. In the event of film fire, the projectionist should shut down the projection machine and arc lamps, operate the shutter release at the point nearest to him (or, if it is automatic, see that it has operated properly), leave the projection room, and close the doors. If the room is equipped with automatic extinguishers, they will, in most cases, put out the fire.

In some cases, hand extinguishers have put out fires even before the automatic extinguisher has gone into action. They should always be mounted at the entrance to the booth and used from outside it. In no case should any person remain inside the projection booth during a film fire, since the fire not only flashes quickly, but also produces dangerous fumes.

When the manager arrives upon the scene, he should find some fire-fighting activity already begun, and should be able to determine what further steps are necessary. He may find the fire under control. Or he may discover that it is necessary to call upon men from other parts of the theatre who have been assigned to a fire-duty post. Since the fire department is likely to arrive within a short time, it is never advisable to involve too many of the personnel in fighting the fire. The primary duty of the staff is the evacuation of the theatre. The majority of the staff should therefore be alerted to evacuation duty, in case this should become necessary.

EVACUATION OF THE THEATRE

In numerous cases, fires have started and have been extinguished without the audience being conscious of any unusual activity. Only recently, an explosion in the air-conditioning system of a large New York theatre resulted in the death of an engineer, yet the audience remained undisturbed.

The judgment of the manager is an important element in deciding whether the theatre needs to be evacuated. If he, or the fire department, finds that the fire is extinguished, or under control, the audience may not need to be dismissed. Until such time as it is decided that evacuation is necessary, every effort should be made to prevent any hint of disturbance from reaching the audience. The turning on of lights, opening of exit doors, or undue movement of ushers, may excite and disturb the crowd, making subsequent panic more likely.

If, however, smoke has seeped into the building, the fire looks dangerously large, or there is some other reason for consid-

ering the building unsafe, evacuation naturally becomes essential. Auditorium lights should be turned on. The ushers and all other available personnel should be mobilized to take evacuation posts, located so that the best control of the crowd is achieved. Ushers should be placed, insofar as possible, near exits and at points of congestion. Since people tend to leave by the route by which they have entered, some theatres make a practice of seating people through the far aisles. In this way, center aisles will be less congested when the audience leaves.

When there is a children's section, the matron naturally takes charge, and it may be desirable to reserve the nearest exit for the children of this section, until all of them have gone.

The presence of an infirm person often blocks traffic seriously. It is a practice in some theatres, therefore, to make a note of the seats taken by such persons, in the event that assistance may be required in an emergency. In some cases, special effort is made to seat infirm individuals in accessible locations.

PREVENTING PANIC

Where theatres conform to modern building codes, there is comparatively little danger from fire itself. The major danger is from panic. Panic does not even require a fire, or the presence of any real danger. A loud noise, an accidental fall, the smell of smoke, or a fight in the balcony are things which can cause injury and even loss of life from no cause but the unreasoning fear which may seize any large group of people, especially when in confined quarters.

A self-controlled staff is the best means of preventing panic. For this reason, all training programs should be designed to make the personnel feel secure, even in time of emergency. Familiarity with the fire-safe construction of the building, practice in using extinguishers, the knowledge that the use of such equipment can put out small fires and keep others under control until the fire department arrives, and that there is a well-organized program for taking care of emergencies—all this is useful in giving the staff assurance which will be communicated to the audience. The feeling that someone is in charge, and that he is capable of handling the situation, can do much toward preventing mass fear.

The relationship of the staff to the audience during an emergency is a vital factor in maintaining calm. The effectiveness of keeping the show going is well known.

In motion picture houses, the manager, or someone delegated by him, should be ready, at a moment's notice, to go on-stage to reassure the audience. He should use a loud speaker, if necessary, take sufficient time to get the audience quiet, and to give clear instructions, and remain on-stage until the theatre is completely emptied. Perhaps the most important fact to get across to the crowd is that there is no hurry, and that everything is "under control."

An example of the effectiveness of this practice can be given by two contrasting accidents in neighboring New York theatres. In one, the sound of fire engines passing by on their way to a fire several blocks away, plus the inquisitiveness of some untrained ushers who rushed up the aisles to see where the fire was, started a quick exodus which slightly injured two persons. In the other (in whose basement a fire actually started) the manager came on-stage just as smoke began to filter into the theatre. He explained that there was a small, but smoky, fire in the basement. Since the building was fireproof, there was no danger. But the smoke might become annoying, so it seemed better to empty the theatre. Would everybody take a few minutes to locate the nearest exit, and then, when the lights went on, leave? There was no hurry, he assured them. This manager was almost too successful. The audience preferred to stay, to see the end of the picture, and it took real persuasion to empty that theatre!

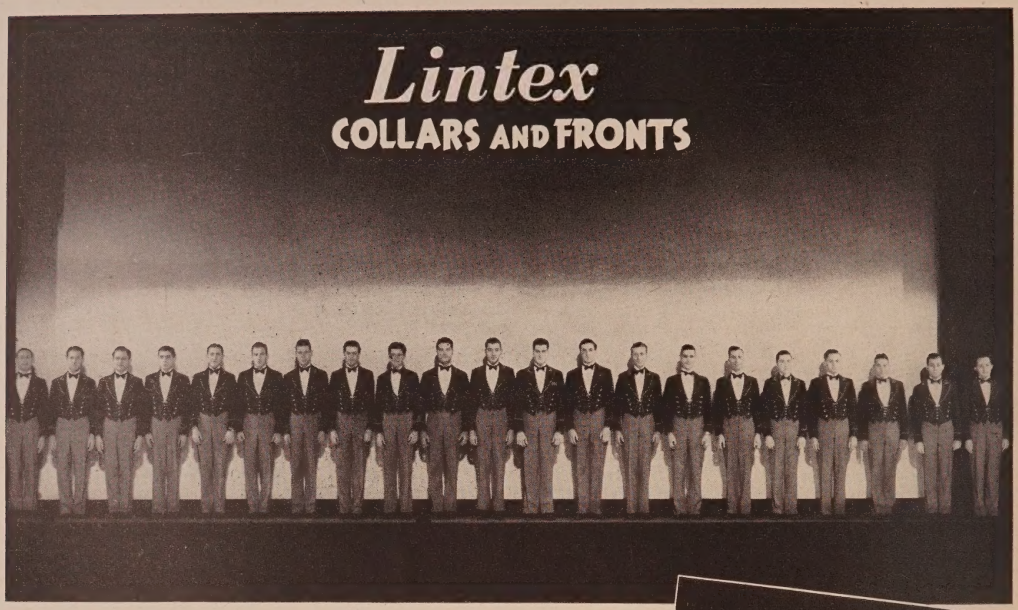
The manager must be able to gauge the temper of his audience, and handle it accordingly. In most cases, quiet persuasion is far more effective than pressure in achieving preferred results. If the crowd is quiet and orderly, a quiet, unhurried approach will prevent the development of panic. Ushers should be instructed to reassure the crowd as it passes, to urge them to hold the handrails going downstairs, watch their step, etc., in as calm a tone as possible. The ushers should urge the audience to "step this way, please," but should never push or force anyone in that direction. An attempt to force a large crowd in any direction is extremely dangerous.

An effective means of keeping movement at a regular, unhurried pace is the playing of a lively march, either by the musicians or on the sound track.

At the first smell of smoke, at the first sign that "something is wrong," there are likely to be a few persons who may become unnerved, and set off a panic. It is at this moment that a clear, authoritative voice can avoid a catastrophe by reassuring the crowd. This is a simple act, yet it will remain undone unless someone has been given the specific responsibility for carrying it out.

In the same way, it is only training and organization that will assure the quick call to the manager or the immediate use of fire extinguishers in time of emergency.

HOW TO USE FIRE EXTINGUISHERS should be taught to all employes of the theatre, from the executives down to the porter. In many communities the municipal fire department stands ready and willing to furnish lecturers for such a training program. All types of fire-fighting equipment installed anywhere in the theatre should be included in the over-all course of instruction. (Iowa City Press-Citizen photograph, courtesy Safety Research Institute.)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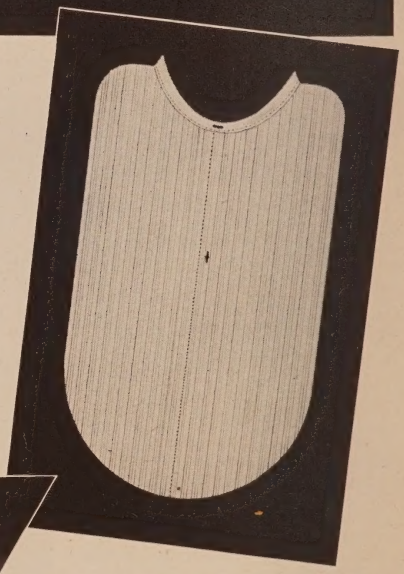

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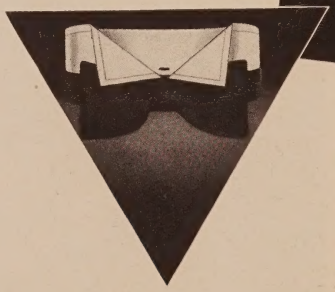

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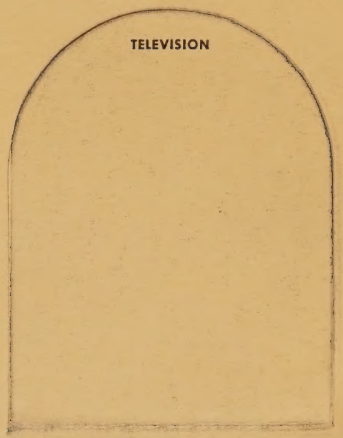
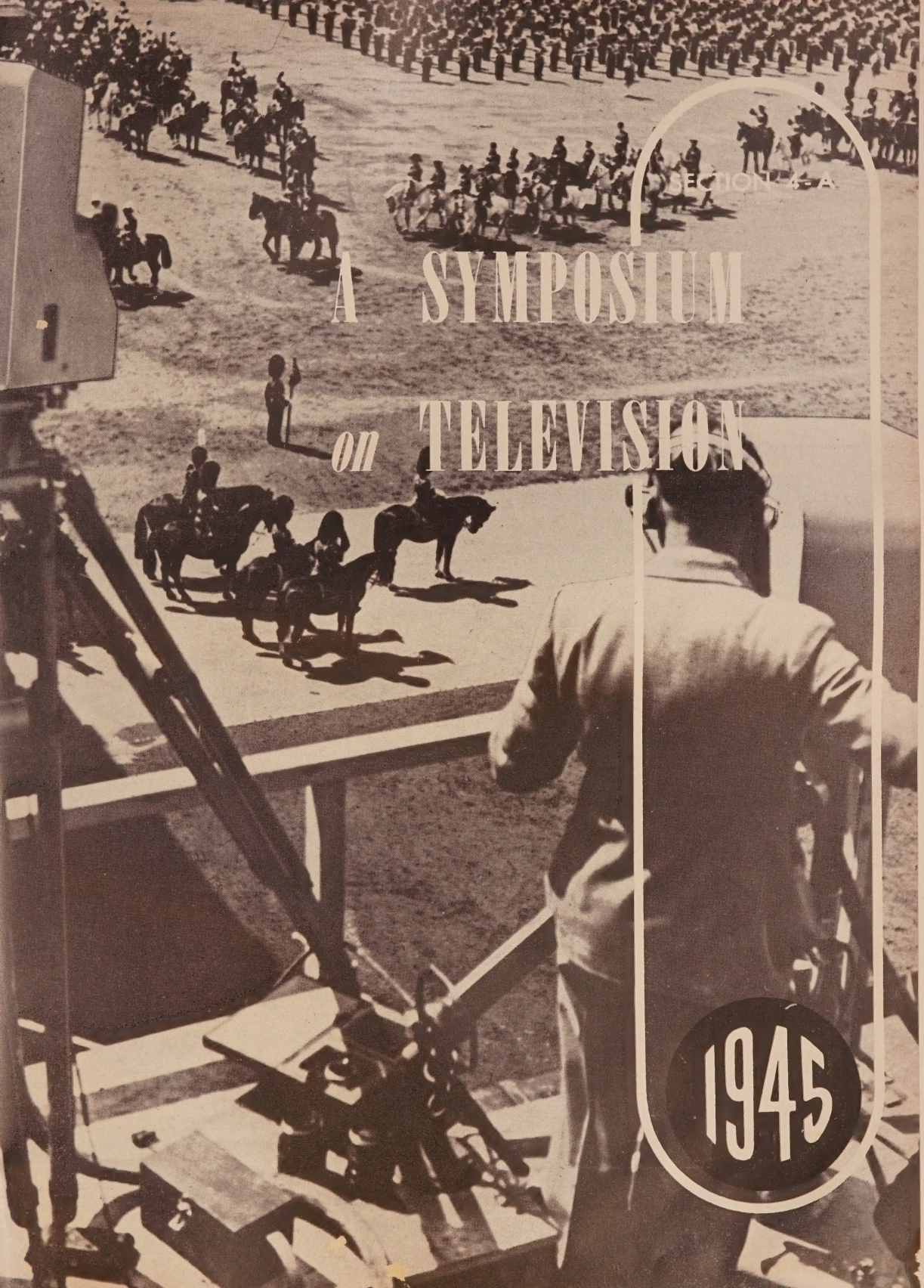




A SYMPOSIUM *on* TELEVISION

1945

Television: A Coming Amusement Industry

Video Art Will Have a Niche All Its Own And Operate Successfully in Its Sphere

By J. R. POPPLE
President, Television Broadcasters Association, Inc.

Television is a magic word. It inspires engineers to probe deeper into the mysteries of the scientific world in hopes of achieving new and even greater electronic miracles. It conjures up in the public mind dreams of endless wonders. Its incomprehensible possibilities open startling new vistas of opportunity.

Its imminence on the American scene heartens those who have fought for its existence; causes others to shrink with fear at the thought of its impact on existing services. Television is magic, indeed.

Yet from a realistic standpoint, television is but another remarkable achievement in an era of scientific wonders. No one can halt its introduction any more than time itself.

I do not believe even hard-boiled skeptics will deny that television broadcasting on a national scale is imminent. Research in electronics, spurred by the hurried demands of wartime, has been amazing. Now that the war is over, much of the work accomplished will become an open book and incorporated into peacetime instruments—notably television.

It is safe to assume that within two years television shall have established itself regionally, perhaps nationally, as a potential giant in the amusement field. Extreme pessimists who see in television a threat to the existing structure of the amusement world are as far off the track as those zealous and well-intentioned optimists who look upon video as a utopia, to the exclusion of all other arts.

Television will arrive on the American scene as a new business, ready to take its place alongside radio broadcasting, motion pictures and the legitimate stage. It will operate in a realm of its own providing a unique form of entertainment to millions of people and creating new wealth for the nation. Just who will be its prime operators remains to be seen, since no one will deny that its very method of operation is similar, to an extent, to existing services.

However, the same held true when the motion picture made its bow a half-century ago and when radio was born after World War I. Television borrows its techniques from many sources, yet by its very novel means of reaching a mass audience, it has individual merits which mark it for greatness.

The rapidity with which television will arrive may be gleaned from existing facts. The nine stations now operating in New York City, Schenectady, Philadelphia, Chicago and Los Angeles, are expected to be augmented by many more before 1950. By September 1, 1945, well over 120 applications for new stations in two-thirds of the 48 states had been filed with the Federal Communications Commission, with indications that this number will be trebled now that the war is over.

Opening of each new station in a currently unserviced area will mean the opening of new markets for receiving sets. Employment in television will soar with each expansion—the need for technicians, actors and actresses, musicians, designers, make-up men, electricians, cameramen, etc., will skyrocket to astronomical figures before the present decade ends.

Advertisers will find in television a medium of unmatched prowess. The demand for consumer goods created by the visual message reaching millions on their television receivers will have a salutary effect upon manufacturers of many products, with a gratifying spurt in employment, as a result.

The ill-wind that hit vaudeville when talkies arrived is likely to have the opposite effect in television, where the demand for vaudeville-type talent will be immense.

The era of television is upon us. Those who might, through error of judgment, find it propitious to pour cold water upon it for fear of its impact upon existing services, are likely to find a strong undertow knocking them off their pins. Those who take its arrival in stride and seek to fit it into the present order will find, to their delight, that television has a niche all its own and will operate successfully in its sphere.

As a new entrant into the amusement field, television will contribute mightily to national well-being. The road to public acceptance has been a difficult one, studded with a maze of electronic complications. Thanks to scientific genius, the pitfalls have been overcome. The going for television from now on should be unimpeded—and terrific.

THE PICK-UP END OF A COMING INDUSTRY is revealed in this close-up shot of a National Broadcasting Company television camera and the network's commentators, taken during a boxing bout at the Madison Square Garden, New York. The regular WNBT program is but one of the features which the public may expect to have delivered into its homes in the future by way of the television. (National Broadcasting Company photograph.)

The Effect of Television on the Theatre

His Possession of a Box Office Will Make The Exhibitor Television's Fair-Haired Boy

By Ralph B. Austrian
Executive Vice-President, RKO Television Corporation

Television is a word which is causing thousands of exhibitors a great deal of uneasiness and worry. They see in it the threat of annihilation and ruin. They thought that once about radio. Home television can and undoubtedly will be helpful to theatre attendance for television will discover, create and popularize more picture personalities than radio. This benefit will come without the collective exhibitor raising a finger. There is a coming phase of television, however, which will make the exhibitor the fair-haired boy of television. That is large screen, syndicated, theatre television. Of all those who are in a position to cash in on television, but big, is the exhibitor. Why? He has 11,000,000 seats and some 18,000 box offices. He can put on his screen events that the public will clamor to see and can see only by walking through the turnstile. I recommend that the exhibitor watch this phase of television most carefully. It is not too far off. This age of miracles in which we are living has a disconcerting way of making realities out of theories during the short period of time some of us are explaining why it can never happen.

FUTURE POSSIBILITIES

Allow me to start off with an assumption—which, incidentally, is quite common when discussing television these days—television for the home will, I am sure, become established before theatre television becomes general. I believe home television's effect on theatre attendance will undoubtedly follow the pattern set by the advent of radio broadcasting, which was no effect at all until several millions of sets were in operation. Then there was a perceptible dip in theatre attendance. However, this recession was short-lived and was followed by full recovery—and, of course, the advent of sound pictures boosted the level of attendance beyond any previous weekly records.

I believe that within a year or two after home television becomes entrenched, perhaps even sooner, equipment will be availiable for the satisfactory and showmanship-like exhibition of television images on the large size screens of motion picture theatres. When this equipment is ready for market, I feel that the motion picture theatre owner—whom I will hereafter call the exhibitor—will avail himself of the box office possibilities theatre television will offer.

I believe all are acquainted with the fact that if satisfactory large screen theatre equipment were available today, intra-city television would shortly be a commercial reality. All that theatre television needs to become a reality, other than the theatre equipment itself, is a means of interconnecting a chain of theatres with cameras located at the scene of the subject matter desired to be exhibited upon the theatre screen. Let me quote but one paragraph from a letter dated March 17, 1944, written by Keith S. McHugh, vice-president of American Telephone and Telegraph Company, to Will H. Hays, then president of Motion Picture Producers and Distributors of America, Inc., more familiarly referred to as "the Hays' Office":

> Knowing the interest of some of the motion picture people in television, I thought you might want to have copies of the attached memorandum outlining the tentative post-war plans of the Bell System for the provision of intercity television network facilities. Within the same city television can be transmitted over ordinary telephone wires, with the addition of suitable terminal and intermediate equipment, or over special conductors provided for the purpose.

This means that a stage show, let us say from the RKO Palace Theatre, could be witnessed simultaneously in all other RKO theatres in Greater New York, plus as many other independently owned theatres as might desire to tie in on this show in their own neighborhoods. The famous stage presentations of the Radio City Music Hall might likewise be subscribed to by other theatres in Greater New York.

ECONOMIC ASPECTS

If we now let our imagination wander a little—and yet not let it get out of control—I think we can see where this practice of syndicating stage shows could grow to a final form of national coverage. There are approximately 18,000 theatres located in 10,015 United States cities, affording a total seating capacity of 11,700,000 seats—or one seat for every twelve men, women and children. There is one motion picture theatre open in the United States for every 8,000 people. It is not the purpose of this article to become involved in figures, but I am sure you can see what a vast box-office potential the theatres of the United States can become for events relayed to them by cable.

Suffice to say that the present monthly "take" is approximately $150,000,000. At the present rate, the theatres of America take in through their box-office windows, in two months, more than the entire broadcasting industry does in one year. Resolved to plain hard figures, it means this: total motion picture admissions per year, $1,800,000,000; total expenditures of advertisers for radio for

EVENTS IN THE SQUARED CIRCLE will probably be among television's top drawing cards in the future, as, in the past, have been motion pictures of the fights. Here is an audience in the New Yorker Theatre, New York, watching a championship prize fight in the Madison Square Garden, brought to the theatre by means of Radio Corporation of America's large-screen television equipment. It foreshadows many coming events. (RCA photograph.)

1943, $300,000,000. The sources of these figures are the Department of Internal Revenue and the Broadcasting Yearbook, respectively.

It is interesting to note that as important as the radio broadcasting industry is —in spite of the fact that it lavishes upon the American public $300,000,000 worth of goods and services "for free" each year—John Public still goes out and spends six times this much—$1,800,000,000 a year—for motion picture entertainment. Does that mean that to see as well as hear is worth six times as much as hearing alone? Does it mean people would rather mix with other people, rub elbows with them, rather than stay at home? Or is it purely a question of showmanship? Does it mean that the motion picture gives such vastly superior entertainment? Each of these suppositions could form the subject matter of a full length treatise.

There is invested in motion picture theatres in the United States today $1,900,000,000. Note please that the collective exhibitor gets his brick and mortar investment back in one year! What I am leading up to is just this: The theatres of America, as you can plainly see, have a tremendous investment and I am sure they are more interested in television and how they can become a part of it than appears evident on the surface.

POSSIBILITIES FOR THEATRES

I think the exhibitor will become one of television's favored beneficiaries. How? Here is an example: There will undoubtedly come into being one or more programming companies, booking offices, agencies (call them what you will) which will have a dual purpose—that of making arrangements with the owners or promoters of such events as prize fights, football games, baseball games, horse racing, etc., and selling these events to the motion-picture theatres of America on either a "per theatre" or a "per seat" basis.

The Races

Let us, for instance, take one single, one-time-a-year event such as the Kentucky Derby. The racetrack at Churchill Downs in Louisville has a very small capacity. The "sport of kings," however, has a tremendous following scattered throughout the length and breadth of this fair land. Any horseflesh fancier, who has ever laid a two-dollar bet on the nose of some nag would jump at the opportunity to see the running of the Kentucky Derby. The exhibitors of America —showmen at heart—will not be slow to visualize this tremendous potential box office. Their programming agency would, I am sure, be able to consummate a deal with the Churchill Downs authorities under whose auspices the race is held, whereby, for the payment of a rather substantial sum of money, this event would be telecast exclusively to the theatres of America. As I said before, there are approximatly 11,700,000 seats—and I daresay that the privilege of witnessing the Derby—not from a seat somewhere behind a post or from the infield without a seat—but from a comfortable chair in one's own neighborhood theatre, for—let us say—one, or even two dollars, would be eagerly accepted.

And it would not be a bad seat either, for you can rest assured that the television cameras will be so placed that millions of pairs of eyes in the theatres of America would have a "down-front" seat. As a matter of fact, they would have better than a "down-front" seat. There would undoubtedly be a television camera stationed at each furlong post and the millions of watchers would be literally going around the track with the thoroughbreds. Watching from a theatre seat would be infinitely better than from a clubhouse seat at the track. You would hear the frenzied excitement of the crowd —the thundering of hoof-beats. You would actually be there without leaving your home town. I feel certain that the Churchill Downs people would be inclined to make this kind of a deal—and I'm sure that no sponsor of telecast programs could afford to meet the ante of the exhibitor. Which is a roundabout way of my saying that the event would be shown in the theatres only and would not be telecast for home consumption.

FOOTBALL, TOO, WILL HAVE ITS THRILLS for television patrons, and such scenes as this — where Dove takes Bertelli's pass for a good 26 yards, in a Notre Dame-Southern California game—will draw many lovers of big-time college football to the nation's theatres. (University of Notre Dame photograph.) Other sports events—like the Kentucky Derby and the Worlds Series—will make for a year 'round cycle of sports events that should draw.

The Fights

Let us take another example—Madison Square Garden would become merely a studio in which to provide a ring, some lights, and a favored few to witness the boxing matches staged in the arena. Millions of fight fans in theatres around the country would constitute the Garden's real audience—not the favored few in the $27.50 seats around the ringside. In the summertime, when fights are held in the Yankee Stadium, which seats 68,000 or more—many of whom, in spite of the high prices paid, are so far from the ring that the fighters look like a pair of dancing mice—when they can be seen through the smoke—these comparatively few thousands will be but a small percentage of the aggregate audience accommodated by the theatres of America—and they'll all have a ringside seat. Here, again, the exclusive rights for the telecasting of top calibre fights could be bought by the theatres of America at a price far beyond the capability or willingness of any "good will" sponsor. In fact, if necessary, the theatre owners themselves could promote fights and any other events which they figure would be a good box-office attraction.

Gen. John Reed Kilpatrick, president of Madison Square Garden, however, has expressed himself as follows:

> At Madison Square Garden every year we have at least 65 attractions of definite box-office value for theatres, running for a total of more than 200 days. We invariably sell out for boxing, basketball, the horse show, the dog show, hockey, the circus, and other events. And there are millions everywhere who would gladly pay money to theatres to see these same attractions by television. Our problem at Garden is to get the people from the suburbs and out of town to come to see our major attractions. The time and cost of traveling are our biggest handicaps. Theatre television will make possible the establishment of Madison Square Garden theatre branches throughout the United States. Then our present capacity of 25,000 will be increased to 1,000,000 or more. And I think that theatre owners can count on events that will fill every seat.

Baseball

Let us take another look—a World Series which might run a maximum of seven games—or a minimum of four—would have a potential theatre audience, on a four-game basis, of 44,000,000 people, or, on a seven-game basis, 77,000,000. You can reduce this figure by any factor you desire, and multiply it by any admission price you wish, and your answer is still an astronomical figure.

One of the leading figures of baseball

has said, "When the World Series games are shown all over the country by theatre television, the amount of money that would be paid into the theatres for the privilege of witnessing these games baffles my powers of multiplication."

And let me add that the exhibitor—clever showman that he is—would probably sell peanuts and hot dogs in the theatre to create the proper atmosphere—and I assure you the "take" from that source alone would be more than just "peanuts."

Football

How about football? Frank Leahy, former director of athletics at Notre Dame University, when asked whether he thought football would fit into the theatre television picture, replied in no uncertain terms, "When 80,000 fans flock to see the Notre Dame-Army game every year, that's just a drop in the bucket compared with the number who'd like to see it. As a matter of fact, in the major cities between New York and Chicago there are about 14,000,000 persons who would give almost anything to see this game as it is being played in New York."

Let us not forget the vast audiences who would be just as eager to see the Army-Navy football game and many of the leading intersectional and "bowl" games—a simply staggering prospect! And remember, at all these events—no "behind the post" seats Every seat the best in the house Think of what daytime events of this type will do for theatre attendance!

Theatres could also be used in the so-called "off" hours, such as mornings, for lecture halls for the educational networking of television programs. Not all schools have auditoria large enough to accommodate the entire student body, but by using neighborhood theatres, teaching by television could be accomplished without the necessity of the school installing expensive equipment at the outset.

Opera and Concerts

Theatres could be used as overflow houses for symphony orchestra concerts, opera, etc. I cite as an example: When Vladimir Horowitz plays at Carnegie Hall, literally thousands are turned away. If this overflow attendance could be taken care of in neighborhood theatres, the theatres would benefit and so would the artist, because of the vastly increased audience The thought might occur to you that the theatre would not be available at the time Horowitz generally plays. I think the answer will be that Horowitz will play when it suits him, which means when he can get the biggest audience. There have been many morning musicals and I do not think we should worry these days about the time of events. That can be arbitrarily adjusted. We are all going to learn that John Public is the one who sets the time. We in show business will cater to his whims.

Stage Productions

Now let us consider what theatre television can mean to the Broadway stage. As popular as "Oklahoma" is, it cannot possibly play in all of the cities in this country where there are people who want to see it, but the very same New York company could appear before the television cameras at a special television studio—and their lovely performance made available to all via the motion-picture theatres of America. For a box office "take," of course.

A stock company composed of the leading legitimate stage stars could put on plays in New York and every motion picture theatre in the country would have the opportunity of presenting to its patrons the great names of the legitimate stage—great actors and actresses who could not or would not undertake the rigors of road shows. The possibilities of this phase of theatre television alone are limitless and breathtaking!

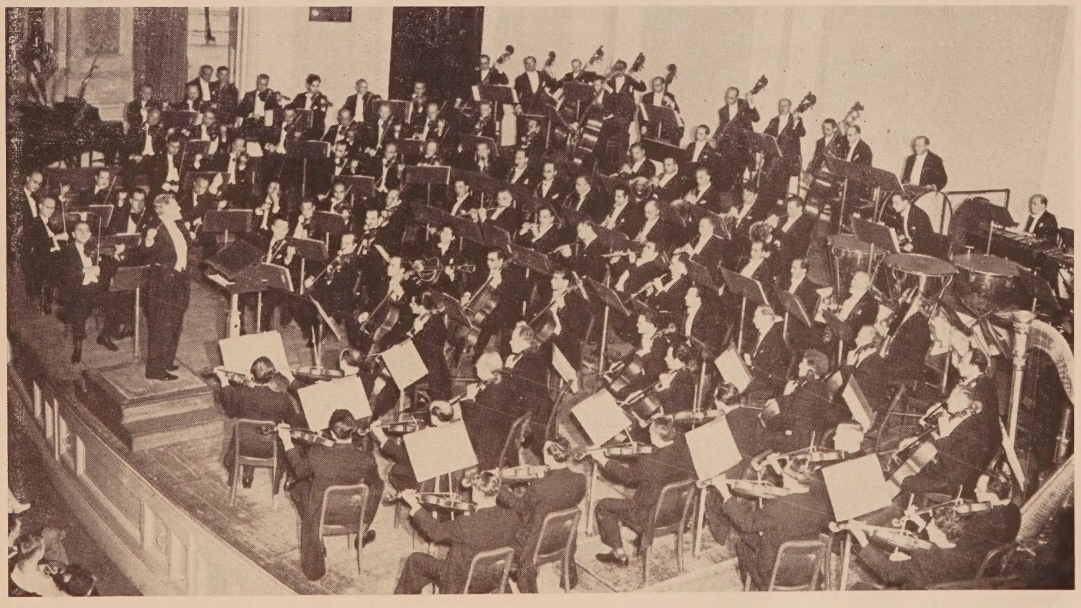
WHO WILL PAY FOR WHAT

The Pick-Up Phase

The question has been asked—who is going to supply the necessary pick-up equipment and personnel to televise these events and carry them as far as the nearest coaxial telephone cable connection? The broadcast chains or, let us call them the telecasting chains, could perform this function but, if they do not desire so to do, the theatre group could well afford their own cooperative sets of pickup equipment and their own operating personnel would transport it to the scene of the event, just as sound newsreel cameras are today.

Events of national and international importance should be shown by the theatres, of course, without any extra charge. When our President speaks, naturally the exhibitor ought to include his image and his words as part of the program and schedule the rest of the show accordingly.

THE GREAT SYMPHONY ORCHESTRAS—and none is greater than that of the Philharmonic-Symphony Society of New York, seen here in a Carnegie Hall program under the leadership of its world-renowned musical director, Artur Rodzinski—are regular sell-outs, and countless numbers turned away, not to mention untold thousands who cannot get to where the orchestra is playing. When such great organizations bring great music to the general public through television, the theatre will have become great in its avowed purpose of bringing the greatest entertainment to the greatest number. (Philharmonic-Symphony Society photograph.)



I do not believe that there is any doubt that the exhibitor will be quick to realize the advantages of theatre television in the post-war period. Up until a few weeks ago, our normal peace-time habits were disrupted—with some of us working the day shift and some of us the night shift, and the rest of us the graveyard shift—theatre attendance benefited greatly. But there will come a time when we shall get back to working eight hours a day, or less, and we will undoubtedly do this work during the daytime, and the theatres of America may once again experience some slim matinee days. That is the time they will book events which will keep their average weekly attendance up.

The Theatre Angle

Many times has this question arisen—How will the theatre owner charge for these extra events? Will he just include them in his regular admission price? Will he ask an additional admission price when these events occur? How can he time his show, so as not to interrupt a feature picture? These questions I think are academic A method of timing will be worked out. As for the prices to be charged for these "plus" events, that again is something that will be worked out as we go along. I certainly believe that major sporting events such as I have described could very easily command a premium price and a premium should be paid. The exhibitor can do one of two things: He can, whenever he has television events on the program, increase his regular box-office prices by an amount varying with the importance of the event, or he can maintain his scale of prices and, by means of the added television attractions, play to more people per year, thus producing more new theatre-goers and, thus, increasing his "rate of occupancy" and increasing his earning power per seat per month.

As an example, a hotel can break even with an annual average occupancy of 60 per cent. Additional room sales are just plain "gravy." The average occupancy of United States hotels during the "Golden Twenties" was only 70 per cent. In the depression it was less than 50 per cent. Today it is running at a fabulous 96 per cent against 60 per cent in relatively prosperous 1939. It can readily be seen therefore that anything an exhibitor can do to boost his rate of occupancy a few per cent results in considerable more yearly income per seat.

SHAPE OF THINGS TO COME

There are still those who believe that home television or theatre television will hurt the motion-picture business. I am not one who shares this view. It is now pretty well established that radio has not hurt the motion-picture business and yet it is a device designed to keep people in their homes. Properly used, radio has helped the picture business. Within the last year motion-picture companies have awakened fully to the tremendous possibilities offered by radio for the exploitation of their product.

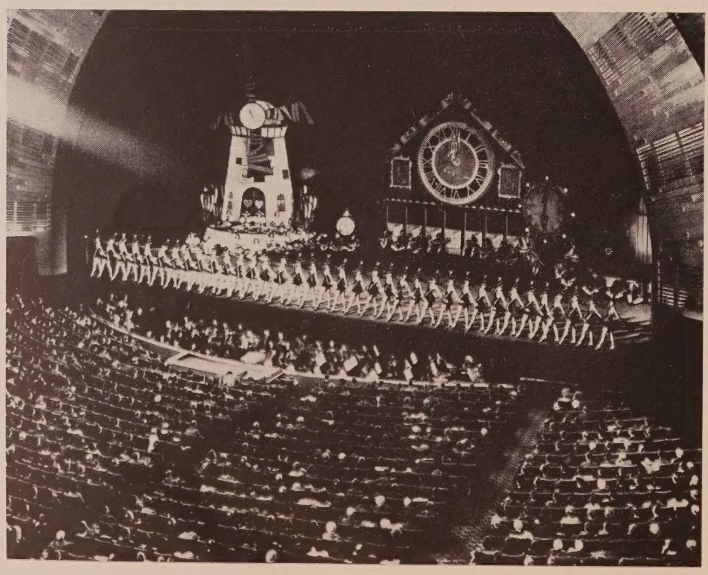
Television will bring hundreds of new personalities to the public eye—the same as radio did. Many a picture star has reached the level of stardom via radio broadcasting. For example, in the 1944-1945 program of RKO Radio Pictures, the following feature or star personalities achieved their popularity via the air waves: Charles Winninger, Fibber McGee and Molly, Bing Crosby, Bob Hope, Frank Sinatra, Joan Davis, Dennis Day, Vera Vague, and Lum and Abner. An examination of the product announcement of other motion picture companies will reveal many more names drawn from the field of radio broadcasting.

One final observation. I have spoken so far about theatre television in relation to sporting events, news incidents, outdoor happenings, concerts, etc. I now want to talk a little bit about the exhibitor's influence upon home telecasting of all kinds. It is not beyond the bounds of possibility to visualize a nation-wide chain of theatres seeking home television personalities as fast as they are developed, and paying them enough to make it worth their while to perform for theatre audiences rather than for the home audience. For example, one of the highest priced comedy radio shows today represents a weekly program cost of about $25,000. When you add the transmission charges, it becomes a lot of money for any commercial sponsor to pay for a half-hour once a week. If the exhibitors felt that they could get five or ten cents a seat more, or merely increase their attendance without raising their scale of prices by booking that personality to appear for theatres only, for a half-hour once a week, they could offer him considerably more than this $25,000 for a half-hour show and could then emblazon their marquees with the announcement: "Jack Benny and Company" (or whoever the Jack Benny is when this situation becomes possible)—"Not at your home—but here!" And I really think that it could become possible.

Television must not be thought of as the exclusive instrument of the broadcasting industry, or, as a matter of record, of any other industry. Television is too big, too all-encompassing, too international in scope to be controlled by group interests. Air planes were invented primarily for transportation purposes. But they helped win the war by destroying and killing. Certainly the Wright brothers never thought of that. The original concept of television was that it would enable millions to see from their homes events taking place at far distant points. I am inclined to believe, however, that many have forgotten this so-called "closed circuit" use of television I have been delineating.

Perhaps there are some who feel I am engaging in some wild flights of prophecy, but I think, if you reflect gravely upon the fact that there are 18,000 theatres in this country which have 11,000,000 seats, that do represent an investment of $1,900,000,000, that do take in today $150,000,000 a month at their collective box offices, you will realize that the theatre owner of America, the exhibitor—a master showman who has progressed in a few years from being the lessee of an empty shoestore, exhibiting crude flickering images, to being the operator of deluxe air-cooled palaces presenting masterpieces of showmanship—is not going to let television pass him by or freeze him out. He and he alone has the one thing which has bothered many of those who have studied the economics of television. He has the answer to the question "Who is going to pay for television?" He has a box office.

STAGE PLAYS AND PRESENTATIONS are also grist to the television mill. When such plays as "Oklahoma" turn away thousands and other thousands visit New York for the major purpose of seeing the famed Radio City Music Hall stage show, the tremendous possibility of television in widening the patronage of these productions is staggering. Even the opera, televised from the Metropolitan stage, would add to any theatre's drawing power.



Motion Pictures as An Ally of Television

The Two Arts Are Held to Be Complementary And Not Antagonistic Entertainment Fields

By PAUL RAIBOURN

Economist, Paramount Pictures, Inc., and President, Television Productions, Inc.

In discussing a subject of this nature, we must of necessity call a spade a spade and in doing so you may get the impression that I do not believe wholeheartedly in the future of television. Nothing could be further from the truth. However, in making an analysis of its characteristics, both strong and weak, as compared with motion pictures it will be necessary to point out some of its faults.

Many of you know that the initial conception of television was described some fifty years ago and that the conception of the cathode ray receiving tube now used in electronic television was explained forty years ago. Twenty years have passed since mechanical television was demonstrated and ten since electronic television was first produced. These are long periods in terms of the present rate of electronic development.

It was only ten years prior to this original conception of television that the motion picture as we know it was conceived. The combination of synchronized sound and picture was received shortly thereafter. Color motion pictures were first shown about 1910 and sound did not really become successful until 1929. It is only in the last ten years that colored motion pictures have become prevalent. These projects have been successful while television has lagged in expansion into general public use.

There have been several ambitious attempts to launch television on its way but it was not quite ready to jump out on its own.

What distinguishing characteristic made motion pictures take a jump around 1900; sound pictures around 1920; and color in the 1930's? The answer is that these latter reached a condition responsive to the human entrepreneurial instinct, namely, one could get back in a reasonable time his original capital, plus a comfortable increase. Call this profit, or loot, or what you will, depending on your political convictions, you must nevertheless agree with Rudyard Kipling, who says:

> . . . bloomin' loot,
> That's the thing to make the boys git up an' shoot!
> It's the same with dogs and men
> If you'd make 'em come again
> Clap 'em forward with a——loot! loot! loot!

When a satisfactory profit becomes available from television, you are going to see television jump in an extraordinary way. It will not have much impact upon motion pictures or any other existing form of entertainment or culture until this requirement is fulfilled.

ECONOMIC ANGLES

So, it behooves us to critically examine the economics of television and of the motion picture as to where profits may arise if we are to see their relationship to each other. The word "critically" is used advisedly. Economics is not an exact science, but there is more loose thinking about it than about any other so-called science. In talking about matters where loose thinking exists it is helpful if definitions of what you are to understand by certain terms are carefully studied.

It is well to realize that to be really fair in a critical analysis of this situation, one must be neither a believer in television nor against it, neither a servant nor an enemy of the motion picture but only an observer. Often a single unclear conviction lurking in a man's head can act like an obstruction in an artery hindering the nutrition of the brain and condemning his thought processes to pine away amid a wealth of interesting stimuli.

Definition of Terms

It is probable, but not altogether certain, that almost all of us unwittingly have the same conceptions in mind when we use the terms "motion picture" and "television." By television, most of us are referring to "commercially sponsored and paid for radio-broadcast free pictures and sound, received in the home." Perhaps some of the words in that definition will seem superfluous but none can be left out without leaving avenues for the inclusion of additional and variant conceptions. When we speak of motion pictures we are speaking of "feature motion pictures with sound shown in a theatre at which an admission is charged based on sequence of run and duration of period from first showing and recorded on photographic film."

BEFORE THE GREAT GATE of the Paramount Pictures studios in Hollywood, cameramen of Television Station W6XYZ shoot a sidewalk interview. Paramount, with a large stake in exhibition as well as in production and distribution, set up Television Productions, Inc., to develop equipment and methods against the time when television should have developed to the point where it becomes an integral part of the entertainment in cinemas.

These definitions should make it clear that we are not necessarily talking about antipathetic elements. "Sound motion pictures" is a term which could be used to describe the valuable program content in both television and motion picture film. It is a term which can also include a large number of elements which are not covered in the definitions above. Motion-picture film, as can television, can be used for advertising, for direct selling, for propaganda, for education, and for any form of transfer of intelligence and information from one person to another. We thus arrive at the conclusion that, basically, it is a motion picture film versus electrical television which represent intrinsically different media and that if there is any real question of "who" will shove "who" around, it is a problem of Eastman Kodak, DuPont, and Ansco as against the Telephone Company, Radio Corporation, General Electric, Philco and DuMont rather than broadcasting companies as against so-called motion picture companies. These two latter groups are probably more likely to help each other than to hurt each other as they build talent for each other and make it popular. Motion-picture companies may make films for television and television may supplement feature film fare in theatre programs. On the other hand, television might displace 16-mm. movies in the home or schools in a reasonable period of time and thereby destroy the dream of the film manufacturing companies of an ever expanding market.

The foregoing is an illustration of the fact that all things are not what they seem to the casual and uncritical observer.

Television's Unusual Characteristic

If the purely economic virtues of film and television are considered, television has at least one extremely unusual economic characteristic. It permits simultaneous viewing and hearing in many places of a single event, at the time that event is taking place. At present, it does this somewhat expensively. But, its important characteristic is that it does allow this simultaneously. Where an event is important because its emotional impact depends on rivalry or personality, everyone would like to view and hear it as it happens. Television, alone, can allow them to do that. It cannot allow them to see it later. Film can record it and allow it to be seen later. Time of viewing can be selected. I repeat for emphasis "time of viewing can be selected," and can be selected with a view to the comforts and convenience of the audience. In addition an order of precedence can be arranged by which those who see are placed in the same time sequnce as their willingness to pay a large or small amount for that privilege.

Imperfections of Television Pictures

There is a further difference between the two which time will perhaps overcome. Television, so far, has been more or less visually imperfect as compared with motion pictures. These visual imperfections are of two classes, viz., artistic and those inherent in the physical media used.

As far as artistic imperfections are concerned, these are usually a result of the spontaneity and the lack of time which television has to make its record and also are economic. Furthermore, there is more second guessing in the making of a good feature motion picture than most of those outside the studios realize, except when they hear of the sorrowful tales of faces left on the cutting room floor. All other items aside, a medium which has the advantage of public tryouts and second guesses has a real chance to do an effective job on the emotions. Economically, what are known as Grade A features cost for negative and positive from $500,000 to $4,000,000 for from sixty to one hundred and fifty minutes of playing time. This analyzes to a cost of from $8,000 to $25,000 per minute. How such sums can be profitably handled except by a direct return from every possible listener and values in accordance with the benefits received is unknown at the present time. The motion-picture theatre serves as the collector who takes the return, deducts cost of exhibition and forwards the remainder to the producer.

Cinematic Comparisons

As to the relative limitations of the physical media involved, the very best a 35-mm. theatrical motion picture can now do would be a comparative standard of 1,200 to 1,400 lines as compared with the theoretical possible 525 at present available on television. All theatres, of course, do not show 1,200 to 1,400 line pictures any more than the television which most of us now see comes anywhere near the 525. Theatrical pictures probably scale down to less than 500 with badly developed or exposed film in badly-handled projection machines. Sixteen-millimeter motion pictures have correspondingly less ability to delineate. However, good picture quality has advantageous physical characteristics other than sharpness. These characteristics have been described popularly as brilliance and gradation. These two factors can, to some extent, help each other and also aid sharpness and vice-versa. In other words, if sufficient brilliance exists, sharpness can be lowered and satisfactory picture quality obtained. The converse also exists. The viewer seldom realizes unless he is a professional or an expert amateur photographer how these factors supplement one another. Television images to date have been weaker in brilliance than in sharpness. At 525 lines, I should say increasing the number of lines will not add much picture quality unless brilliance is increased above the degree usual at present. And, when the word brilliance is used, we are not referring to the ordinary meaning of the term, namely, absolute maximum light value, but we are referring to the contrast ratio of a perfect white to a perfect black in the picture as compared with the contrast ratios and absolute light values reflected from similar associated and nearby visual objects. Mentally, good brilliance in a picture is the feeling that there is no blacker black nor no whiter white than exists in the picture. Without this, gradation means little and visual definition beyond a certain point adds nothing to the picture. In this respect the new DuMont black tube adds more to the picture than any improvement I have so far observed.

Production Costs

From this consideration, let us turn to what are known in the motion picture trade as "B" and "C" pictures, and what are known in the motion picture trade as shorts. Their costs range from $1,000 to $8,000 per minute with probably a mode or median figure around $2,000 to $3,000 a minute. At these costs, the lower range of picture costs begin to merge with the higher range of sound broadcasting costs. If the relative values of sight and sound as selling media are anywhere near what we are all assuming they are, it is possible that advertisers will be willing to pay to put on advertising before their public at an amount which will correspond to these figures. If they are, motion picture producers for these types of material are going to develop from television producers and vice versa. It is possible, as has already been announced by one company, that the motion-picture studios turning out this type of film will make them for television or even that television may, to some extent, take the place of them in the theatre. Any short films made for television will have certain advantages over network television. The best hours for showing can be chosen with ease, either on the East Coast or West Coast, or even for repetition if it is found advantageous.

News Presentations

This may be especially true of the motion picture news which will probably combine, where possible, both television news and motion picture news. To rely on television news alone would be to make it impossible for anyone to see any news other than that which is momentarily happening, which at any one time is normally little enough. Anyone who has tried to make up two issues of motion picture news every week, during peace time, is aware of the limitations of available material as are the editors of our great daily newspapers, who, in absence of conditions where wars and communiques take up space, must sometimes, when crime is quiet, spread their political and sport news rather thin to fill up their papers and allow a satisfactory balance between advertising and reading material.

Available Literary Material

If one examines what literary material meets these two requirements one runs directly up against the short story or the sensational feature article which makes up most of the printed material in our present-day periodical publications. These probably all have just about the right size and amount of content to make them fit into a fifteen-minute or half-hour presentation. Furthermore, they are usually so designed as to be chock-full of dramatic episodes or single idea sensation. They have only one climax and point only one moral. Their literary structure can probably be taken over almost completely into the television technique.

THEATRE ANGLES

There is one phase of the motion-picture field where television is going to definitely apply. This is in the theatre itself. It is possible, of course, that we may have purely television theatres, as we now have news theatres, but there is reason to doubt that it is a probability. The reason is the dearth of material, unless much of the program is to depend on cultural and educational material, and even soap operas, as sound broadcasting does now. So far no one has been able to sell much of these items and satisfy the paying audience in a theatre. Furthermore the film program at the present news theatre is shown over and over. If theatre television programs should be shown over and over again, we would again find a situation where television is competing with film as a distribution medium to the theatre. Present-day economics are completely against such a possibility for repeated film performance is now decidedly cheaper and will probably continue so for some time to come.

The Theatre's Interest

So far, the content hereof could lead one to wonder why a motion picture company like Paramount is following television closely.

Paramount is the largest owner of theatres in North America, being interested directly, and through affiliations, in some 1,600 theatres. We keep day to day records of how attendance varies with the production used, the weather, the season, opposition attractions, and many other items. One of the curious phenomena which has appeared in connection with these studies is how certain types of events of national interest have influenced attendance. The study and analysis of these fluctuations in relationship to probability and chance is a fascinating study in human individual and mass psychology. As examples, there are two groups of events which have had very definite influence on theatre attendance. The first of these is world championship prize fights. That reaction will, I believe, be quite understandable to all. The other is more esoteric. When President Roosevelt made his original fireside talks, the drop-off in theatre attendance on the nights of the talks was extraordinary. Gradually, the effect became less and less. We had an automatic index of the President's popularity or, perhaps, an index of the gravity of the crisis his public expected him to discuss or, perhaps even, of their belief that he was likely to pull another rabbit out of his hat, as happened so often in the early days of his administration.

The theatre business is largely a fixed-cost business, that is the cost of operation of the theatre is within certain limits independent of the theatre attendance. So a large drop in attendance on some periods could turn a profitable week into a losing one. Television might be an instrument which could accentuate such a tendency. In 1937 and 1938, Paramount politely inquired of the leading interests in television what apparatus was available which would enable them to follow the development of television and were emphatically told there was none available for them. Paramount decided to develop its own apparatus.

Since then our study of radio and television has convinced us that the theatre will lend certain values to television which are not possible in the ordinary home assembly.

There has also been some discussion to the effect that name bands, such as were used at the Paramount Theatre and have now spread in succession to the Strand, Roxy, and Capitol, might be used as television programs synchronized with the programs at other theatres throughout the country. This possibility awaits the establishment of satisfactory and economic transmission facilities throughout the country.

Large Screen Television

Some of you readers may be interested in the characteristics of the various means of producing large screen television. The heretofore fairly successful ones may be described as high intensity fluorescence and supersonic optical mechanical pictures. These, so far, have not exhibited satisfactory picture quality for continued theatre use, largely due to insufficient screen brilliance. Two more which are somewhat tied up with present secrecy restrictions are Scophony's electronic opacity tube, popularly known as the Skiatron or dark trace tube, and RCA's electron electrostatic control of micromeritic suspensions. You will probably learn more about these soon. Meanwhile, we have satisfactorily, for the moment, solved the problem of the use of intermediate film, which we do not doubt will have an unusual place in theatre activities.

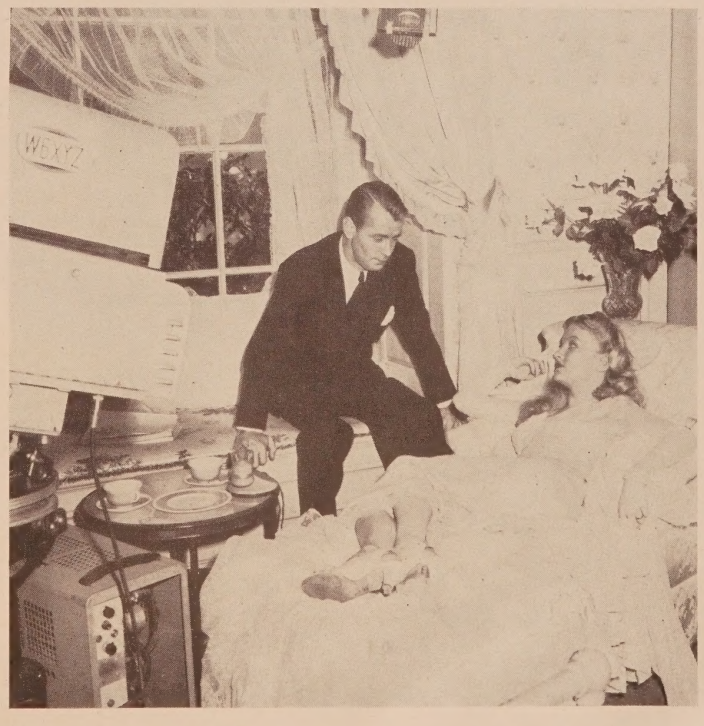
* * *

There is something more which should be emphasized. That is the fact that every conclusion which has been reached herein has been based on certain unstated technical assumptions. These assumptions can be summarized into a general one, namely, that new electronic instruments will fall into the patterns in which we now conceive them. But many will change, and as they do, the impact of television upon motion pictures, upon theatres, upon radio broadcasting, upon books, magazines, newspapers, education, our home life, and our political outlook will change.

It is probable that in this article I have encouraged ideas dear to the hearts of some of you, while I may have innocently ridiculed those of others. To the first group, my statements will appear fair and conclusive, to the second they may appear biased and shallow. But if we are to learn we must have the frank thoughts of each other. When the opinions of others hurt, it is well to remember—

> . . . that the processes of time, of creative thought and of logic are pitiless. They respect the convenience of none nor the love of things held sacred, yet they work toward the increasing glory of the world, toward the growth of knowledge, the advancement of understanding, and the enlargement of human life.

HOLLYWOOD'S INTEREST IN TELEVISION, backed by its years of motion-picture production and its present roster of top-rank talent, is symbolized in this picture of Alan Ladd and Veronica Lake in a boudoir scene from a program aired from Television Production's (Paramount's) W6XYZ. With such talent available, together with the know-how for presenting the finest visual entertainment, Hollywood must take the lead in this new field.



History of Theatre Television in Britain

Past Experiences and Future Developments Give Factual Data to American Exhibitors

By CAPT. A. G. D. WEST
M.A., B.S., F.R.P.S.
President, British Kinematograph Society; and Technical Director, Cinema-Television, Ltd., Baird Television, Ltd., and Societe Continentale de Television, Companies Affiliated with the J. Arthur Rank Organization

The English cinema exhibitor is somewhat bewildered regarding the subject of television and how it will effect him in the future. Previous to the war, certain cinemas in London had large-screen television equipment installed, where certain programs of a topical nature transmitted by the British Broadcasting Corporation were reproduced on the screen to paying audiences. The results achieved indicated that, with the normal course of technical progress, television projection could, in time, provide a picture equal in quality to that given by normal film projection. But the practical problem of the use of television for cinema entertainment, particularly in respect to how programs could be built using the television medium, was the subject of much conjecture, and insufficient experience was available to enable the exhibitor to obtain a clear view as to how such entertainment would be organized and presented to the public. Television in England ceased to function in September, 1939, for security reasons, and, since that date, owing to the 100 per cent application to the war effort, no progress has been made from either the technical or the program point of view.

FIGURE 1.—The Baird large-screen projector unit (an early 1938 type) shows the cathode-ray tube and the lay-out of the projector. Such a projector was installed in London's Tatler Newsreel Theatre. The 3x4-inch image was projected by an f/2.5 lens to an 8x10 screen. (All pictures and diagrams of this article have been furnished by Capt. A. G. D. West, to whom a debt of appreciation is owed for this most comprehensive and lucid chronicle.)

Many authorities—scientific, technical, and commercial—have expressed their views regarding the future of television in the theatre. Although it was generally agreed that television will eventually revolutionize theatre entertainment, detailed expressions of opinion have been highly divergent, and the English exhibitor is somewhat confused regarding the future. He realizes that the situation will in due course arise similar to that brought about by the introduction of sound, and the general tendency is to be prepared, on the assumption that some day not far distant a commercial system will be presented to him. The exhibitor, therefore, will take the opportunity of studying, as technique progresses, the program and entertainment aspects of television, so that he will be ready to incorporate it into his theatres when the equipment has been engineered to operate on a basis technically satisfactory to the general public.

There are many who believe that home television first, and later theatre television, will have an adverse effect on the cinema business generally, but similar remarks were made on the advent of broadcasting, when many prophesied that that form of home entertainment would have a devastating effect on both the phonograph and theatre industries.

The reply to such pessimistic expressions of opinion is that television will provide a technical means for the provision of new types of entertainment, and it is up to the exhibitor to see that he makes the utmost use of such a new tool for his own future benefit. Thus, television enthusiasts, who have made a close study of the commercial possibilities of the use of television for the entertainment of cinema audiences, have forecast that, provided a broad cooperative view is taken by all the various entertainment interests, including those concerned with sporting and similar events, the opportunities for expansion in the entertainment industry could be enormous, and would fully justify the wildest dreams of the most imaginative exploiters in the entertainment field.

The following observations aim at giving a review of the position of theatre television in Britain where, the war now being over, work will be re-

sumed; a summary of the aims of the technician in preparing for full commercial use large screen television equipment, and the means whereby programs can be provided for such an equipment; and a statement of the various aspects which will need to be considered in detail by the exhibitor between now and such time when commercial equipment will be available on the market.

HISTORY OF BRITISH TELEVISION

Broadcast Television

The beginning of official transmission of television in England was due to the dogged persistence of John Logie Baird, who, as a result of his experiments and demonstrations over the period from 1923 to 1928, was able to get the British Broadcasting Corporation to radiate vision signals, first in 1929 by an experimental service, and later, from August, 1932, on, in the form of a regular program service. These television transmissions provided over the normal broadcasting channels a low-definition picture on a 30-line basis. Such a coarse texture of picture rendered the transmission of small detail impossible, and the program, although interesting, had little entertainment value. But it started the ball rolling, and, from 1933 on, work was commenced in many laboratories in England, America, France, and Germany toward the development of a higher standard definition.

The low-definition broadcast service ceased in September, 1935, and its place was taken by trial transmissions from the new television station at the Alexandra Palace, London, commencing in July, 1936, on a 240-line standard provided by the Baird company, and a 405-line standard with interlaced scanning developed by the Marconi and E. M. I. companies. The latter standard was subsequently adopted by the B. B. C. for the transmission of television programs to home viewers.

During the three years from August, 1936, to September, 1939, some 20,000 home television receivers were sold in the London area; the majority of these incorporated direct viewing cathode-ray tubes with a picture size between 8 x 6 inches and 13 x 10 inches.

During this period, there was very rapid development in the type of program material. Not only was studio space at Alexandra Palace considerably enlarged to allow a variety of studio programs to be transmitted, including plays and variety productions which involved the use of multi-studio technique, but the range of outside events was increased by the laying of a ring cable of the coaxial type, connecting the more important points of entertainment and interest in the London area, and also by the provision of a mobile equipment which linked such events as rugby football matches on the outskirts of London and the Derby at Epsom Downs 20 miles away, with the Alexandra Palace for rebroadcasting from that station. The hours of transmission for home screens averaged 18 hours a week, usually one hour in the afternoon and two in the evening, and the improvement in programs, particularly in respect

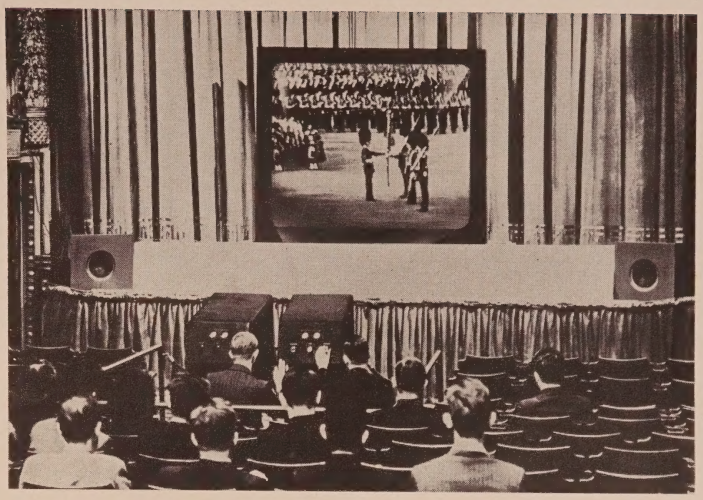


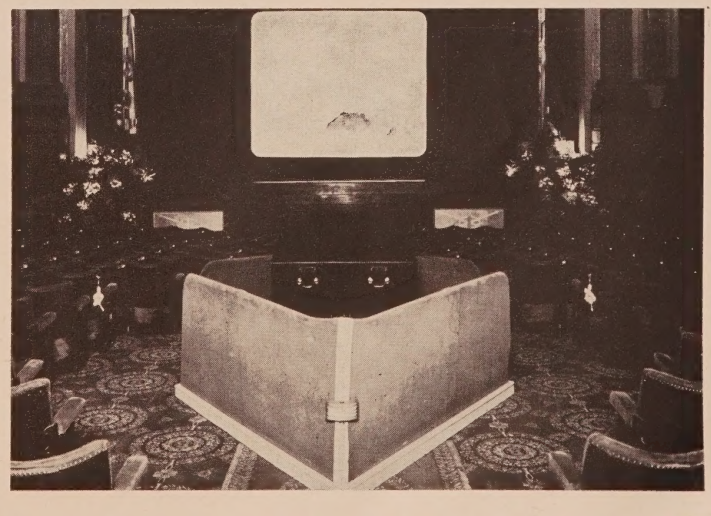
FIGURE 2.—The equipment shown in Figure 1 is seen here in operation in the Tatler Newsreel Theatre, in London in 1938. The projector, observed in the middle ground, is manned by a crew of two. The picture size on the screen is 6x8 feet. Note that the special horns for use with the television sound are placed on either side of the stage. Theatres of the Gaumont-British Picture Corporation were used for some of the early experiments.

to outside broadcasts and actualities (such as cricket, tennis, and boxing matches) was so considerable in 1938 and 1939 that the home televiewer had exceedingly good value for his money. So far, the London area was the only favored area, but plans were in hand for an extension of the service to the Birmingham area and other centers of population. Television was brought to an abrupt conclusion in this country on September 3, 1939, and since that date no transmissions of any type have taken place. However, the subject of the future development of television in Britain has been considered by a committee appointed by the government in 1943, whose report was published April, 1945. This committee advises resumption of the television service in London as soon as possible with an early extension to provincial cities. It is believed that programs for the home will be in full swing in the London area by May, 1946, and that, by the building of six provincial stations, the home television service will by 1948 or 1949 be available to 75 per cent of the population of Great Britain.

Progress of Theatre Television

Since 1934, attention has been paid to the possibilities of producing television

FIGURE 3.- This is the Baird large-screen television projector installed in the auditorium of the Marble Arch Pavilion, in London, in 1939. In the background can be seen the television screen, which is 12x15 feet. With more powerful equipment, the apparatus is moved further from the screen, but the same time necessitating the removal of some 50 seats from the center of the auditorium level. Increased patronage may compensate this loss.



pictures for demonstration to larger audiences. There have been three main lines of development, each of which has had a practical result: Mechanical Systems, Intermediate Film Projection Systems, and Cathode-Ray-Tube-Projection Methods. To these can be added a fourth—light valve systems—which is in process of development but has not thus far yielded a satisfactory practical result.

Mechanical Systems.—Mechanical systems were founded on the use of mirror drums or lens discs rotating at high speed to effect the reconstitution of the image. In general, it has been found impossible to operate such systems on a definition higher than 120 lines, and the need for a very much higher definition standard in the cinema has rendered obsolete the use of such mechanical systems where, in addition, the light output is severely restricted. It is worth while, however, to refer to two methods where reasonably good results have been achieved. One is the Scophony optical mechanical system where the use of a "storage" light valve has enabled a much greater picture brightness to be achieved for what is fundamentally a mechanical system. This system has been developed to a stage where large-screen pictures of good definition and brightness have been, as will be described later, commercially exploited. The other is to a large screen color demonstration given by J. L. Baird in the Dominion Theatre, London, in 1938, where a two-color system was used and pictures were reproduced by rear projection on a screen 10 x 8 feet. This demonstration was introduced into the regular theatre program for paying audiences for a period of some weeks.

Intermediate Film Projection.—This method consisted of photographing the television picture reproduced on a small cathode-ray tube on a film which, after rapid development, fixing, and drying, was projected as a standard film through the usual 35-mm. projector. The advantage of this process, which was developed both in Britain and Germany, and demonstrated to theatre audiences in 1935, is that it is possible to provide the normal standard of brightness on the theatre screen because the processed film passes through a standard projector. The degree of definition was quite high, but the method proved to be somewhat expensive, due to the high film costs incurred; the 60-second delay in reproduction due to the time of processing of the film was not regarded as a serious defect. Such equipment in practice, however, needed a very high degree of supervision, and the maintenance of the processing baths and of the mechanical parts of the projector is regarded as being somewhat beyond the practical limitations imposed by the day-by-day continuous service of cinema projection. However, there are many who still have faith in this method of television presentation, because it has the additional advantage that, by putting the received television picture on film, a permanent record is made in the theatre and this could be used over and over again in subsequent performances.

FIGURE 4.—A rear view is seen here of the Baird large-screen, double-headed projector unit, installed in the New Victoria Cinema, in London, in April, 1939. Seen in the picture are the projector tubes and the controls, and in the background can also be seen part of the 12x15-foot television screen. Again installed in the center of the auditorium, the equipment required the removal of a certain number of seats in the theatre's choicest location.

Cathode-Ray-Tube Projection. — This method involves the stepping up of the normal cathode-ray-tube television receiver of the home to a high-power basis, so that intensely brilliant images of a size approximating 6 inches in diameter can be projected by efficient lens or mirror systems to the full cinema screen size. At this present moment, this method appears to be the one offering the most scope for future practical development. It formed the basis of the equipment developed by the Baird company for installation in 1938 and 1939 in the theatres of the Gaumont-British Picture Corporation. The historical development of these installations follows.

Early in 1938, a small projector was installed in the Tatler Newsreel Theatre in London (Figure 1). It consisted of a cathode-ray-tube, operating on 30,000 volts, and reproduced an intensely bright picture approximately 3 x 4 inches which was projected by a f/2.5 lens on to a screen 10 x 8 feet (Figure 2). The illumination on the theatre screen was of the order of 1 foot candle and demonstrations were given of various actuality programs transmitted on the 405-line basis by the B. B. C. These were mainly in the form of private demonstrations and for a small theatre of that type, with a total seating accommodation for 683 people, the results were regarded as eminently satisfactory. The equipment was entirely of an experimental nature and could not be handled by anyone but a specialist. These results gave encouragement for further work in larger theatres, and, early in 1939, the Marble Arch Pavilion with a seating accommodation for 1,290 was equipped with a higher power, dual cathode-ray-tube projector, operating on 60,000 volts, providing an illumination of 1 foot candle on a screen 15 x 12 feet (Figures 3, 4, 5, and 6). This equipment was used for special programs on a commercial basis for paying audiences and the success of the results achieved led to the Gaumont-British Picture Corporation's ordering 12 equipments for installation in

the larger London theatres. By September, 1939, the following theatres had been equipped with these standard projectors:

Marble Arch Pavilion	1,290 seats
New Victoria Cinema	2,564 seats
Tivoli	2,043 seats
Gaumont, Haymarket	1,328 seats
Gaumont, Lewisham	3,047 seats
Tatler Theatre	683 seats

The incidence of war prevented the equipping of other theatres, and thus the plan to have selected television programs presented at twelve London theatres, to a total audience of approximately 22,000, was never realized. At the same period, Scophony, Ltd., with its system, equipped the Odeon Theatre, Leicester Square, and certain news theatres, and were attracting full audiences for special programs (Figures 7 and 8). The postscript to this particular program of development was seen in the transference of some of this projection equipment to America, where demonstrations were given in theatres in New York parallel with the RCA theatre demonstrations at the New Yorker Theatre. Some of the original Baird equipment manufactured in England and redesigned in America is still operating for private demonstration purposes in Chicago on the commercial television programs radiated in that city.

Light Valve Systems.—Various theoretical proposals have been made to secure projection with almost unlimited brilliancy by devising a television projector consisting of a cathode-ray-controlled image of varying density (for each element of the image), which, operating as a continuously variable lantern slide, can be projected by an external light source and lens on to the theatre screen (Figure 10). Reference is made later to some of the methods that have been suggested, but the only practical result which has been achieved up to date is the AFIF projector developed and built by Professor Fischer of the Swiss Federal Institute of Technology in Zurich. In this equipment a thin film of liquid is subject to the action of a cathode-ray beam, which deforms its surface in such a manner that the point-by-point density is changed in accordance with the picture pattern scanned on its surface. An exterior arc lamp projects through this film and a lens on to the theatre screen. So far the detail obtained has been of the value of a good 250-line picture. The work on this equipment has been going ahead rapidly during the war, and it is anticipated that a picture with higher detail will soon be available with ample brightness. The projector which is shown in Figure 9 appears at the moment to be rather expensive to manufacture.

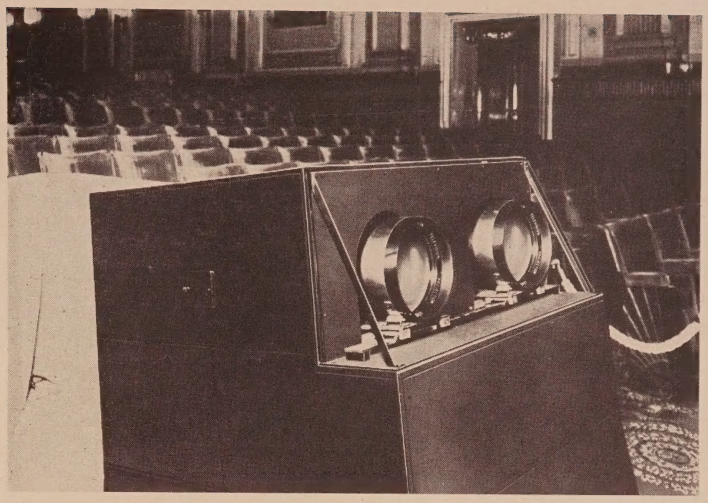


FIGURE 5.—Here is the front view of the Baird large-screen, double-headed projection television unit as installed in January, 1939. While a bit older than that shown in Figure 3, the equipment is of the same general type. A barrier fence, as high as the backs of the opera chairs, is generally erected to keep interested patrons away from the apparatus and to eliminate the danger of accidental damage to the equipment by curious patrons.

TECHNICAL ASPECTS OF THEATRE

The Complete Theatre System

It is the ultimate aim of the television engineer to provide the entertainment industry with a complete television system which can handle and distribute all types of program material which will be of interest. The system and the equipment utilized therein can conveniently be divided up as follows:

(a) Pick-up equipment, consisting of cameras and associated equipment for synchronizing control for interior (such as studios and inside events) and for exterior (out-of-door) scenes together with the necessary sound pick-up, lighting, and power supply.

(b) Film scanning equipment.

(c) Control-room equipment, for the purpose of selection and routing of programs.

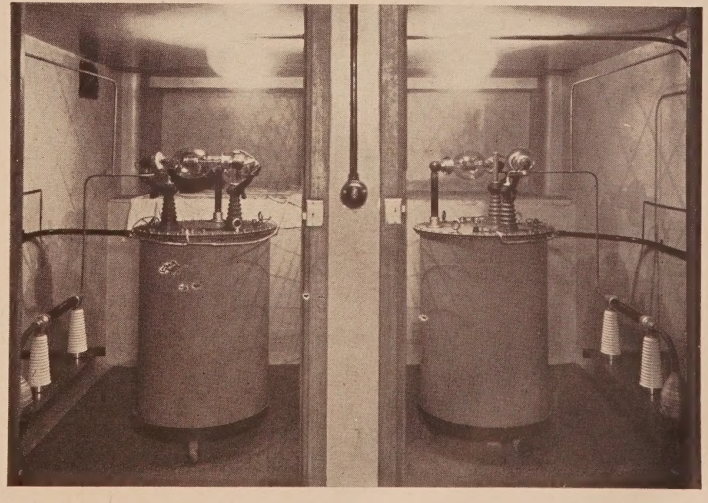
(d) Distribution network utilizing special cables or high-frequency radio relay channels.

(e) Theatre television projectors and loud speakers.

Figure 11 indicates a possible system of pick-up, control, distribution, and theatre reproduction which is capable of dealing with events taking place mainly in the London area and distributed not only to theatres in London, but theatres in the provinces also.

With the termination of the war, progress under all the above headings will recommence until eventually there is evolved a satisfactory system which ex-

FIGURE 6.—To supply the high-tension voltage to the equipment shown in Figure 3, a dual installation is made. Here are seen the high-tension units in duplicate that are used to supply high-tension voltage to the Baird large-screen projector installed in the Marble Arch Pavilion, in London, in January, 1939. Note, from the shadows, that the equipment is housed in airy but strongly screened-in locations. Note, too, size of the conductors!



hibitors will welcome as a valuable contribution towards their theatre entertainment. The aim of the technician, who is primarily concerned with this aspect of television, will be to secure perfection independently in each of the divisions of work enumerated above. Outstanding among the problems are the following: (1) An increase in system definition, which will mean general progress under all sections; and (2) the improvement in theatre projection to a form comparable to the present film projection.

On the remaining problems—namely, improvements in cameras, film scanning, cables, and radio links—much progress has been made, and the final necessary improvements will come in the course of solving the two major problems referred to above.

Equipment Used in Theatres

Taking as a basis equipment which has so far successfully been used, where definite lines of improvement can now be visualized, development in the first instance will no doubt be concentrated toward obtaining a brighter and better picture with the high-voltage cathode-ray-tube projection system which so far has formed the basis of the more recent demonstrations given by Baird, E. M. I., and RCA. The first two have demonstrated high-voltage cathode-ray-tube projection with large aperture lenses; the last with an effectively large aperture mirror system. All three, however, have been projected from the center of the auditorium. The question of the positioning of the projection equipment is regarded as not of such great importance as the problems associated with the general improvement of the projected television picture.

Comparison with Cinema Standards

We must face the fact that television projection at the moment compares unfavorably with normal film projection for the following reasons.

Brightness.—The maximum high-light brightness so far achieved on the theatre large screen has been of the order of ½ foot lambert compared with 5 to 10 foot lamberts provided by black and white film projection.

Definition.—So far, nothing has been demonstrated having a definition represented by a standard of 525 lines, and it is doubtful if the best picture so far shown has had in practice a value of definition represented by a 300-line basis, on account of the many losses which are due to limitations in various parts of the system. If the equipment could reproduce the full detail associated with the perfect 525-line system, the picture would be good, but even then nothing like as good as the projected film which represents detail corresponding to something between a 1,000- and 2,000-line basis of scanning.

Quality of Picture.—The favorable reproduction of half tones in a full range of contrast has by no means yet been achieved. Many of the results bring to mind the soot and whitewash effect often associated with the early motion pictures; they show shadow effects which are disconcerting to the viewer, and the range of contrast between full black and full white is very limited.

Color.—Television has so far nothing to offer which can compete on the large screen basis with the color film.

Progress under these headings, particularly in respect of the first three, is of primary importance compared with problems of installation and operation.

FIGURE 7.—Here is the Scophony mechanical-optical receiver-projector, installed in the Odeon Cinema, on London's Leicester Square, in 1939. It was equipment of Scophony, Ltd., which was used in some early theatre demonstrations in the United States, and some of this original equipment is said to be still in use in Chicago. At the Odeon, as well as in other theatres where equipment was installed, special televised programs attracted sell-out audiences.

Future Developments

The more important problems to be dealt with immediately are as follows.

(a) The determination of higher standard of definition necessary to provide the detail required, then having determined that to concentrate on the electrical equipment which will provide the synchronizing control and the amplifying and modulation needs for the requisite transmission channel. For example, supposing that it is agreed that approximately a 1,000-line basis will give all the detail that will be necessary, then a synchronizing generator system must be evolved, together with the video frequency and radio frequency systems that can handle modulation frequencies up to 20 megacycles a second. This factor determines also the requirements for distribution by cable and radio. Present coaxial cables, although very expensive to install, will satisfactorily handle frequencies only up to 2 or 3 megacycles a second. The extension for higher definition will increase the cost of these cables very considerably. The alternative is to use ultra-shortwave relay links which are limited in range. Thus we see quite a considerable program of work to establish in practice the higher definition standard and the distribution of pictures on such a basis.

(b) The problem of increasing brightness with existing systems of cathode-ray-tube projection depends mainly on three things: (1) Increasing the brightness of the image in the cathode-ray-tube, and this in turn depends on being able to develop fluorescent materials

which can operate at a much higher power. (2) The development of the projection optical system. The maximum efficiency appears to have been reached that is possible by straight projection by lens, but great improvement has been effected by RCA and others using a mirror projection system, and much work is now being done with a view to developing further types of optical system to increase the light efficiency. And (3) the design of a special television screen for the stage to make better use of the light projected on it. Some screens have been developed both in Germany and England, where the light received by the screen is reflected back not all over the theatre, as in the case of the standard matte white screen, but concentrated directly into the seats of the auditorium. Much more efficient screens are, therefore, possible and the brightness to the individual observer in any seat may be in this manner increased three or four times.

It is likely, however, that we shall arrive at a limit in cathode-ray-tube projection systems which will even then not provide a picture as bright as the cinema requires. The ultimate projector of electronic type is envisaged as a type of light valve as described above. (Figure 9.) A device of this type should not be restricted as regards illumination and brightness of picture on the screen, but so far only very imperfect results have been obtained with a device of this nature. The idea was put forward by various investigators, for instance, by V. Zworykin; by J. L. Baird, under the name Diavisor; by A. H. Rosenthal of the Scophony company, in the Skiatron tube; and also by J. S. Donal and D. B. Langmuir, who have proposed and demonstrated a light valve consisting of suspended opaque particles which are oriented under the influence of an electron beam to form an image which could be projected. Thus, we are faced in pure electronic methods by an extension of the present cathode-ray-tube projection system, which appears to have limitations, and by various theoretical proposals which have so far not been justified by practical experiment but which many believe will provide the ultimate form for cinema projection.

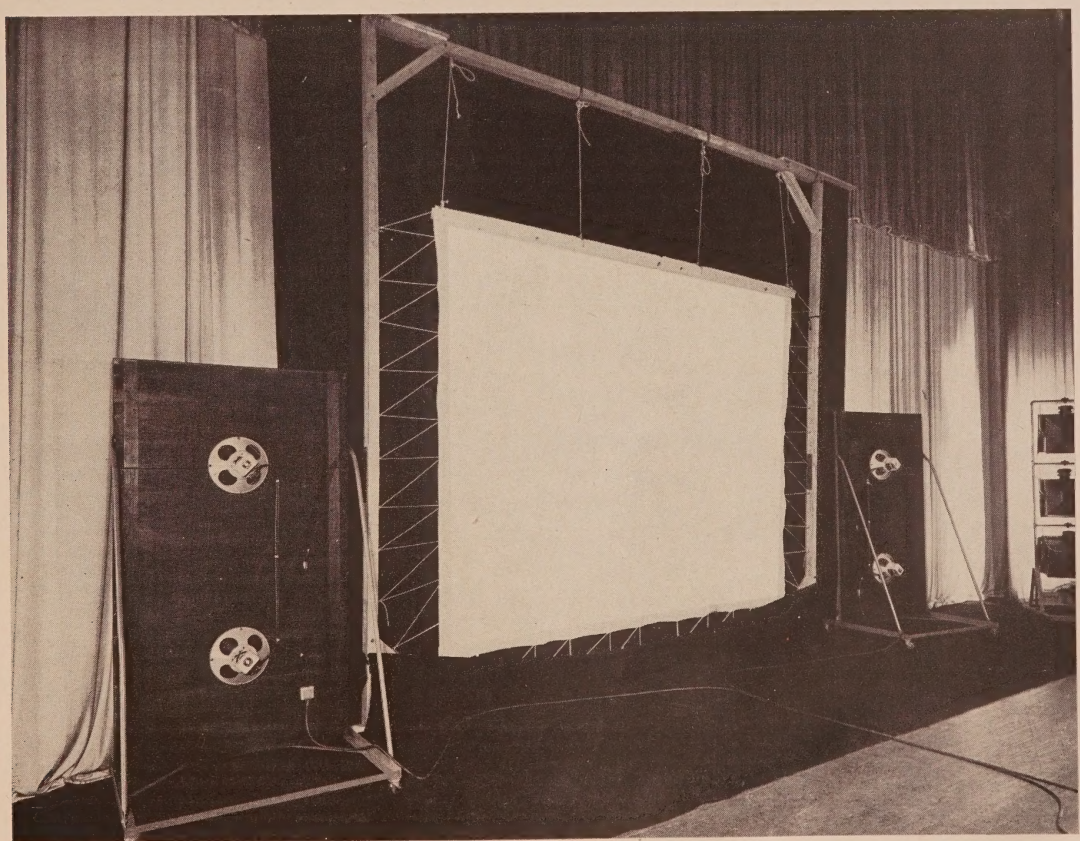
Some authorities still believe in the future of the above-mentioned intermediate film system, whereby a television signal is impressed on the photographic film which is rapidly processed and then projected in the theatre. We have seen good results by this method, and we are able to obtain a permanent film record in the theatre itself of the pictures thrown on the screen, but the majority of engineers have faith in the development of a full electronic system to which the intermediate film method can be applied as an adjunct whenever it is necessary in the theatre to make a permanent record of the projected programs.

The possibilities presented by the before-mentioned AFIF system of Zurich, must also be borne in mind in considering future lines of development.

Installation of Equipment

So far, equipment has not been produced which enables the television picture to be projected from the booth. Equipment has either been installed in the center of the auditorium (either in the middle of the orchestra or at the

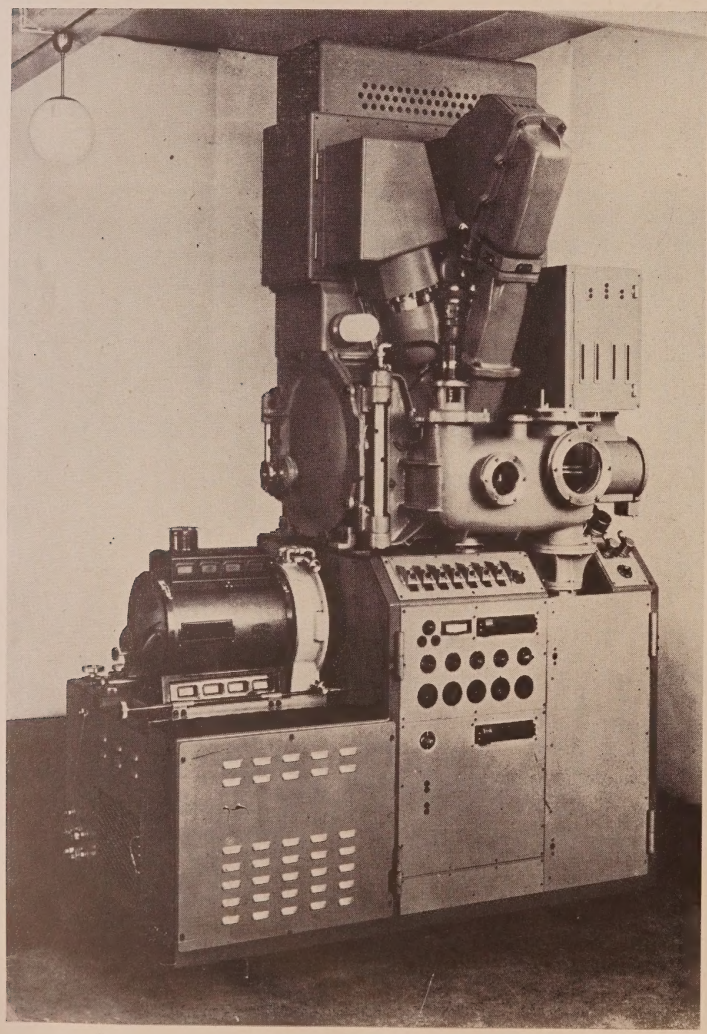
FIGURE 8.—Here is a back-stage, close-up view of Scophony's 12-foot screen installed at the Odeon Cinema, in London's Leicester Square, in 1939. In the picture can be well seen the manner of handling the special loudspeakers required for delivering television sound to the theatre audience. Also note the manner in which the screen is hung and laced on a wooden frame which can be raised into the fly loft when it is necessary to reset the stage for the continuation of the cinematographic portion of the program. At the extreme right of the picture can be seen a battery of three flood lights which is part of this well-equipped stage.



front of the balcony) or, alternately, in back of the screen where there has been enough space, for rear projection.

In general the equipment is divided into two parts: (1) the projector itself, with cathode-ray tubes and lenses and radio receiver, amplifier, and synchronizing equipment, together with controls of brightness and contrast; and (2) the high-tension equipment which has to be located under the auditorium or under the stage or at the side of the theatre in safety cages. Where theatres have been equipped to operate on a commercial basis, the local regulations for safety have had to be observed, and the principal points needing attention arise from the fact that very high voltages are used in the projector and that the cathode-ray tubes, operating at such high voltages, have been liable to generate x-rays. The ever-present danger of electrical shock has been eliminated by the providing of electrical interlocks and other safety features, and the generation of x-rays by the surrounding of the cathode-ray-tube compartments by shielding sheets of lead. So far these precautions have been sufficient to obtain the approval of the local authorities, but, no doubt, in course of time, the only satisfactory position for the television projector will be in the projector booth, where all essential equipment for projection will be completely divorced from the auditorium. The installation of equipment will be subject to the usual regulations for fire prevention and safety. Reference has been made to the screen on the stage. To obtain every ounce of brightness it has been found necessary to develop screens with a much higher reflecting power than the normal matte-white screen. Thus, provision may have to be dropped from the fly loft when the program changes over from film to television presentation.

FIGURE 9.—This is the AFIF high-definition television projector developed by the Swiss Federal Institute of Technology in Zurich. The arc lamp on the left projects through the liquid-film, cathode-ray-controlled light valve (center) and the projection lens (right) into the auditorium. The work on this equipment has been going ahead during the war, and it is anticipated that a picture of better than 250 lines will be available very soon.



Operation in Theatres

So far, the cathode-ray-tube type of equipment has been partly of an experimental nature, and this has necessitated that it should be operated only by experts who, through having taken part in the practical development of the equipment, are fully conversant with its servicing and maintenance, but in due time the equipment will assume a form where it can be operated and maintained by technicians of average skill. The present-day projectionist needs to cover a fairly wide field of experience—the handling of film, the maintenance of mechanical equipment and of the sound amplifying system, and the care of arc lamps and of medium power generators. In the future, his training will tend much more in the electronic direction, where he will have to be conversant with television theory and practice, and with the operation of the controls associated with the high-voltage cathode-ray-tube projector. The projectionists of the key theatres, where television was about to be installed, were required to attend a special course in electronics, with opportunities of practical experience in the adjustment of circuits and in the setting up of the cathode-ray tubes and optical systems. Today, the average projectionist is mainly concerned only with the adjustment of focus in the projector for the picture, and of volume level in connection with the sound reproduction. Now, he will have to learn how to achieve correct centering of the picture, correct contrast and definition, so that a high-quality result can be maintained throughout the program. No doubt much of his work will be simplified for him by means of automatic control, but backing him up in his job there will need to be a well organized service of highly skilled maintenance engineers, and a regular daily routine testing to make certain that programs run smoothly and without a hitch.

For instance, in the early days of television projection, cathode-ray tubes will not have a particularly long life, possibly not more than 1,000 hours, and the projectionist will have to be skilled in the rapid replacement of these tubes in the equipment.

The projection booth of the future can be visualized as having two or three standard film projectors and two television projectors, both of which latter will take up as much or possibly more room than the film projectors. Thus, architects, in building new theatres or modifying existing ones, would be well advised to prepare for the future by allowing plenty of room in the projection booth over and above the requirements of normal film projection. Allowance should at the same time be made for a separate room close to the projection box with safety, interlocking doors, for setting up the high voltage equipment which will be necessary. A particular

point to be watched in this connection is that high-tension cables should be as short and direct as possible and without pronounced bends, to avoid the production of brush discharges.

Program Distribution

Very little work has been done so far in the setting up of a network for the particular purpose of distributing television to cinemas. Normally, the programs have been taken from an established radio transmission, and for this purpose directional aerials have been erected on the roofs of cinemas which feed the radio energy down to the radio receiver in the projector. In the future, two methods of distribution will have to be worked out in parallel. One method is by coaxial cable, which has so far proved to be very expensive, and which, in terms of present technique, has set a limit on the amount of detail which can be carried, but helpful results have been obtained over short distances by the use of standard telephone cable with repeater stations at frequent intervals to correct for the losses incurred. It is quite possible that, in due course, standard telephone connections will be satisfactory for working from one point to another inside a particular city, but, for transmission from one city to another, the cable method is bound to be very expensive. It has the advantage, however, of maintaining secrecy and reducing interference compared with the second method, which is by radio relay. (Figure 12.) Developments during the war on ultra shortwaves indicate that the point-to-point radio transmission of high-definition television signals will be a practical possibility, and the technician who wishes to develop a network of nation-wide distribution will undoubtedly study each method and make use of either cable or radio in accordance with circumstances. One of the disadvantages of the radio method is that the ether is subject to many forms of interference which are not yet under control. Diathermy installations, high-power high-frequency heating equipment in factories, motorcar interference, and many other types all need to be watched as being factors liable to ruin the reproduction of a television picture. For instance, close by one of the theatre installations in London was a medical establishment where diathermy equipment was in constant use. The only way to insure a satisfactory demonstration free from interference was to ask all the members of the medical institution to attend the performance so that their equipment remained silent. No doubt, many of these forms of interference can be eliminated by local screening and other methods which may have to be enforced by legislation.

Costs and Charges

It is difficult to estimate at this early stage of the art what the exhibitor will have to pay to have a complete television large-screen equipment. Before the war, the cost of a projector for providing pictures 15 x 12 feet, which would satisfy the public on the occasion of special events and including the cost of spare tubes for replacement, was approximately £2,500 ($10,000). This figure, however, cannot be taken as a basis for commercial installation. The figure may be higher or it may be lower, and it is impossible at this stage to give an exhibitor a basis which will enable him to calculate whether such a capital outlay would be justified in box-office results. Several years must pass before the production price of equipment can be established, and then the exhibitor will have to know what service he is going to get with it, before he will be able to decide how far the exploitation of television will benefit him. In due course, naturally as the situation develops both technically and commercially, he will find that he will have to install television to satisfy his public.

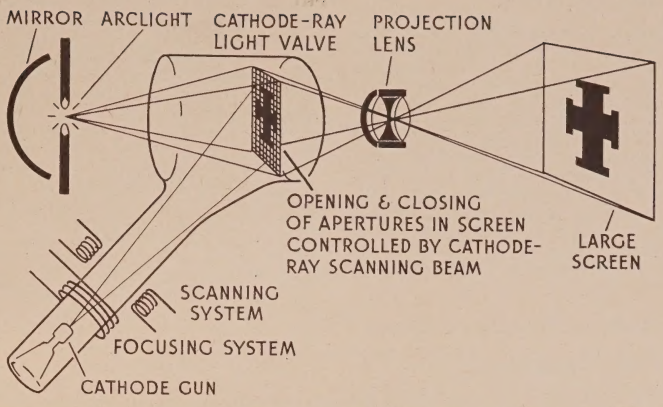
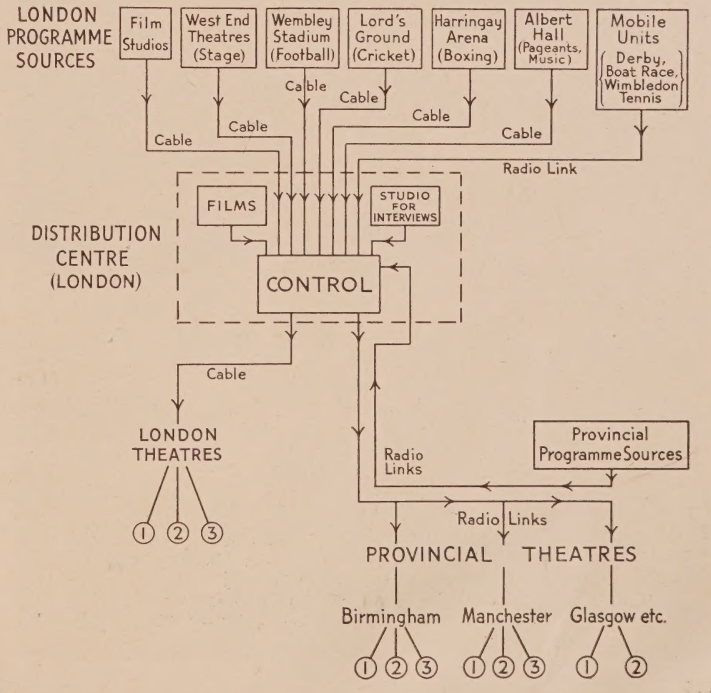


FIGURE 10.—Here is a diagram of the light-valve (storage) projection system. In this equipment a thin film of liquid is subject to the action of a cathode-ray beam, which deforms its surface in such a manner that the point-by-point density is changed in accordance with the picture pattern scanned on its surface. An exterior arc lamp projects through this film and a lens on to the theatre screen. The projector (see Figure 9) appears expensive.

FIGURE 11.—Here is a diagram of a complete theatre television system, comprising pick-up, control, distribution, and theatre reproduction. Such a system would be capable of dealing with events taking place in one urban area (such as London) and distributed not only to theatres in that city but also to theatres in the provinces. Note that the pick-up points include motion-picture studios, stage theatres and music halls, and the centers for sports.



Development of Color

The development of color on the large screen presents many difficult problems. Color is now only just being achieved with a certain degree of satisfaction for presentation in the home on small screens suitable for an audience consisting of a handful of people. Its full exploitation for the large screen will entail much complicated development work which must naturally follow after the perfection of the large black and white screen. Thus, at this stage, no one would hazard a guess as to how and when large screen color will be available to the exhibitor.

TELEVISION THEATRE PROGRAMS

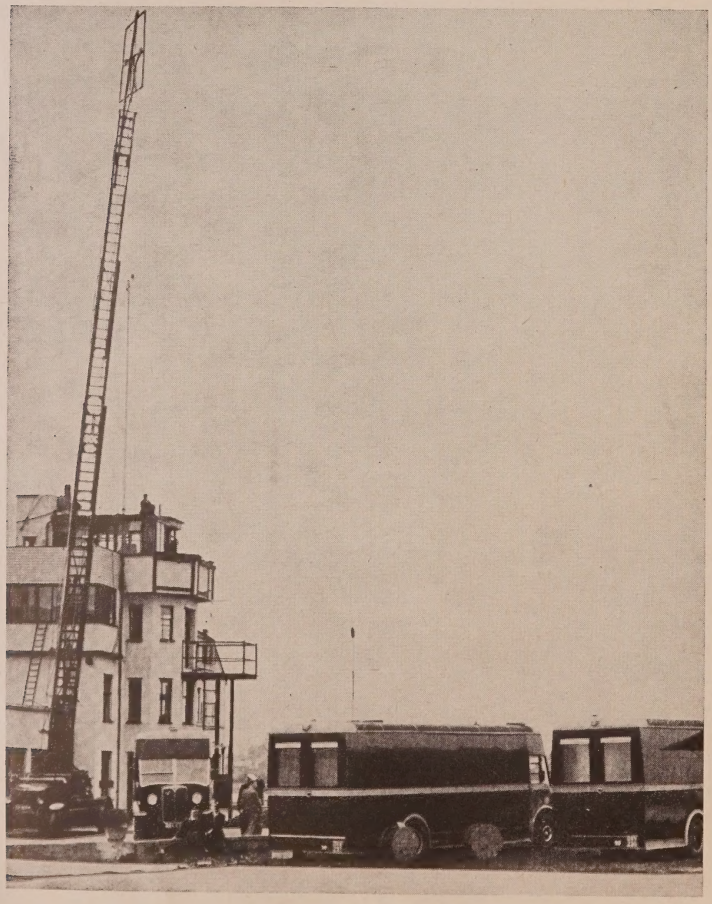
Box-Office Requirements

The programs so far presented in the theatres have consisted mainly of actualities. Some of a sporting nature, where the outcome was unknown—such as the Derby from the race track at Epsom Downs, the Oxford-Cambridge University boat-race, and some boxing matches which have been world championships—were greatly publicized. (Figures 14 and 15.) There have been also actualities of the news type—such as the Cenotaph ceremony with His Majesty the King (on this occasion an unexpected disturbance in the crowd created special interest), the visit of the French president to London and the Trooping of the Color. (Figure 13.) Then finally there have been variety items transmitted from a studio or another theatre. The response by the public was in the order of the events summarized above. The maximum response was for the sporting items, where, in their progress towards the final climax, the excitement in the theatre was raised to fever pitch.

From the indications given in these early trials, exhibitors feel that television presents an opportunity of revitalizing the theatre industry. While the technical quality is sufficient for the time being to attract audiences from a novelty point of view (there is no doubt that the interest of the public in sporting items generally has increased considerably since the termination of the war), for sustained profit-making, the general technical quality must be greatly improved, and the steps to be taken have already been outlined above. The most important requirement in the forthcoming advancement of television to insure its commercial success will be to make certain that both technical development and program exploitation advance in step together. To the technician the scope of scientific advance is limitless, and in the same way the program builder must realize what an outstanding opportunity there will be of filling his theatres.

The real return on an outlay for securing exclusive rights on "live" events of the type described above will come when reproduction of such events is not limited to key theatres but extended to suburban and rural areas, and later throughout the provinces. No doubt the public will pay higher admission charges than normal to be able to see such events when they are actually happening.

FIGURE 12.—Pictured here is a British Broadcasting Corporation mobile unit for the radio relay of television events in the London area. The equipment consists of a camera truck, radio transmitter truck, and a fire-escape aerial. Another method of relay is by coaxial cable, but this has proved to be very expensive and, so far as present equipment is concerned, sets a limit on the amount of detail carried. Interference is also a problem.



Home Television Other Entertainment

For a form of entertainment to be successful, it must demonstrate advantages over other kinds of entertainment which appeal to the public. Many feel that home television will keep people at home, and that theatre box-office grosses will suffer accordingly. They even go so far as to say that the cinema industry must also get into the home television field, so as to be able to influence home televiewers in the direction of getting them back into the cinema. However, this prophesied effect on box-office grosses was not generally found to be the case in the somewhat limited pre-war experience in Britain. The habit of "going out," particularly among the classes of people that form the majority of cinema audiences, and in this I am referring to age classes rather than to income classes, is not easily changed. Provided that the cinema continues to present attractive entertainment it should not fear competition in the home. On the contrary, there are many people who feel that home television, with its limited screen size, is lacking in reality, and that, in due course, when the novelty factor has evaporated, the family household will not make a regular performance of gathering around the home television set with their friends any more than they would now do so for broadcast sound programs only.

The British government television report, issued in 1945, expresses the view that television in the home and television for the cinema will be able to exist side by side in a manner which will prove to be mutually helpful rather than otherwise, and that "home and cinema television are likely to have a stimulating effect on each other." The real answer is that, provided that television is a means of bringing "live" events or actualities into the cinema to support the existing "canned" programs, it need have no fear of competition by home television.

As regards relationship with the legitimate theatre and music halls or variety,

the general presentation will be so different from that of the cinema that we are likely to see no change in the situation whereby the stage will be detrimental to the cinema or vice versa.

Independent Service for Theatres

In spite of the cooperation between cinema and home-television interests recommended in the British government television report, it is clear that the theatre must prepare to develop, both technically and politically, quite independently. With such a new field of endeavor introduced by television, competition must inevitably result, and, therefore, exhibitors must consider at an early stage the question of building up a good political situation, so that eventually the rights of presentation of special programs are not denied to them.

Combined Films and Television

In the likely future progress of theatre programs, we shall see a gradual absorption of television into the regular daily performance. First, we shall have to be prepared to instigate a service of news items, and of primary importance among these will be the events, as emphasized above, where the result is a matter of speculative interest. Later, we shall find the introduction of news items and matters of daily topical interest which do not come under that heading. The next stage will be to screen interviews with interesting personalities, for example, with the Chancellor of the Exchequer on Budget Day, or with the captain of the Australian cricket team on the day of his arrival in England. Each and every day should provide an opportunity of such interviews which will be greatly strengthened by the fact that they are being seen and heard at the moment when they are taking place and are being distributed throughout the country for the benefit of all those who have paid for cinema admission. Next in order of importance will be fashion displays, outdoor pageants and items of general interest, which will be greatly enhanced by the fact that they are being seen "in the flesh."

Thus, in the process of progressing, the gradual entry of television into the program as an adjunct to the presentation of the feature film, I have no doubt that a new technique of program planning will have been developed which will organize to the best advantage the combined resources of film and television.

Progress Toward Electronic Method

It will be seen that the next logical step after the successful distribution of "live" items to cinemas will be the distribution of films. Such a technical stage having been reached, whereby the detail and quality are up to the appropriate standards, the object of making use of the television system for the distribution of film material is two-fold; first to save the cost of a large number of film prints, and, second, to simplify, which might otherwise prove to be a considerable difficulty, the timing of programs issued to various cinemas on a large network. We may see, in fact, the method developed so that the complete program, whether it consists of feature films, shorts, or "live" television items, will be distributed to a large number of cinemas from central control points.

Such a state of affairs, however, is not likely to replace the normal film production methods used in making feature films, although such methods are likely to be speeded up in the general progress towards greater efficiency with saving in production costs. A comparison has already been made by Ralph Austrian in his paper to the Society of Motion Picture Engineers on May 15, 1945, of the two methods of presenting a play by television. One method is to use multi-studio technique and complicated cut sheets, followed by many rehearsals, to give instantaneous rendering of a play in front of the television camera. The other method is to put the whole play on to film which can be edited at leisure to result in a polished presentation where the tempo and continuity are fully maintained. In no way can the former equal the latter when it is a question of getting over a bright, and fast-moving show. The same must apply to dramatic presentation in the cinema. There will always be the need for a properly produced film by the established methods, even though such a film may not get beyond one copy which will be used at the control center when the feature is

FIGURE 13.—The pomp and circumstance of royalty are also subjects for television pick-up, as, for example, the Trooping of the Color shown in this British Broadcasting Corporation photograph. Actualities of the news type have been broadcast, such as the Cenotaph ceremony with His Majesty the King (on this occasion an unexpected disturbance in the crowd created a special added interest) and the visit of the French president to London.

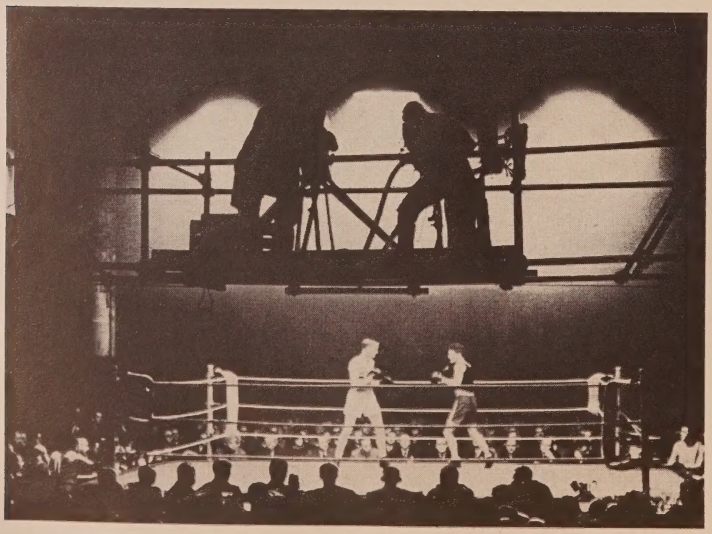
FIGURE 14.—As probably also will be in the United States, sports events have proved popular in England as subjects for television broadcast to theatres. Here, courtesy of the British Broadcasting Corporation, is seen a television camera picking up the Oxford-Cambridge boat race in April, 1938. Another event which has been handled to the delight of the theatre-going public is the Derby, broadcast from the track at Epsom Downs.

being distributed to all houses in the circuit.

Box-Office Charges

The prices of admission always have to be decided in relation to the running costs of the presentation. So far, no information is available as to the costs of running a large television service of the type outlined, or even of enabling one to make a comparison with the present costs of production and of maintaining the exhibition of films. We do know, however, that, at the sporting events, which were reproduced on cinema screens before the war, it was possible to charge up to four times the normal admission prices and yet secure full houses. No doubt the novelty factor was the determining factor; but, although television comes to the cinema as a means of creating new program interest, it must also come as an economizing factor, and the cost to the public of providing television programs will, therefore, depend on the degree of exploitation and on the diversity of the service. With a thousand cinemas equipped to reproduce a popular event, and with exclusive rights for dealing with that event, a circuit of cinemas should be able to command huge audiences at profitable admission charges, but to be able to prepare a balance sheet at this stage of development is obviously impossible. The opportunity will be available for the realization of the full possibilities of theatre television, and that opportunity will be taken by those leaders of the industry who have made the cinema as we know it today, a medium of entertainment which is unsurpassed.

FIGURE 15.—Sports, however, are the top favorite of the British public going for television in its theatres. In this British Broadcasting Company photograph is seen a boxing contest staged at the Alexandra Palace, in February, 1937. The television cameras are on a cradle above the ring. While television broadcasting was, of course, stopped during the war, it will be resumed, and an even greater interest by the general public is expected.



SUMMARY AND CONCLUSIONS

The present stage of development indicates that the normal technical progress television can give the exhibitors a valuable and powerful medium for advancing theatre entertainment.

The technical development of a satisfactory system required that particular attention should be paid to (1) the introduction of a higher definition system; (2) increased brightness, detail, and picture quality in the projection on the large screen; (3) improved cameras and scanners for the pick-up of picture material; and (4) the development and organizing of a nation-wide radio and cable distribution system.

The expenditure on research during future years is bound to be considerable, and the capital expenditure for equipment will be costly, but the results will well justify the outlay.

Premature exploitation before the necessary technical results are achieved must be avoided. Technicians and scientists must be given time to develop a system giving results comparable with present film projection, and they must not be rushed into premature installation and demonstrations.

The problems of program planning and production must be considered in parallel with technical development.

Film production by present methods will continue, but the presentation of the complete theatre program will be powerfully aided and vitalized by the incorporation of television.

The distribution of entertainment, whether of feature films or of "live" events, will be likely to be carried out electronically from central scanning and control centers, thus displacing the physical distribution of actual films to cinemas. The system will primarily be available for "live" items, and its use for feature and general film material will depend on economic considerations.

The presentation of these "live" items, especially those events whose main attraction is the uncertainty of outcome or result—for example, horseracing and football matches—will be the backbone of the purely television contribution to the program.

The transition from the experimental stage to an established service need not disturb the motion-picture industry. On the contrary, provided that exhibitors take an active interest in its progress and show vision and forethought in anticipating its possibilities, there is a wonderful opportunity and future for theatre television entertainment.

"Why" of Television in One-Syllable Words

Facts Every Theatre Operator Should Know To Understand Why Television Is Possible

By James Frank, Jr.

Fellow of the Society of Motion Picture Engineers

In order that the explanation of how a television system works and the description of the modern apparatus used in television will be clear and comprehensible, we will consider first the theory of electronic devices.

ELECTRONIC DEVICES

All of them, naturally, involve the electron, the smallest known quantity of negative electricity. All electrons are alike. All matter is made of electrons. Protons are also found in all matter, the proton being positively charged. Electrons may be removed from the atoms of certain substances more easily than from others.

All negatively-charged bodies repel each other; so, too, do all positively-charged bodies. However, negative and positive charges attract each other. In other words, there is a tendency toward a balance of charge, and since a body is said to be charged negatively only because of the absence of protons, or vice versa, it is natural that oppositely charged bodies should attract one another.

Electrons in motion constitute an electric current. Electrons ordinarily move in any direction, but experiments have proved that electrons are similar to tiny magnets and may, therefore, be guided by magnetic fields.

Electrons may be more easily removed from metals in general than from other substances. Electrons are packed in metals so tightly that adjacent atoms share mutually each other's electrons. Since the electrons flow about freely in the atoms in all directions, it is possible to impress an electrical pressure or voltage upon the metal and cause electrons to move in a uniformly given direction, thus setting up an electric current in the metal.

Electrons are removed from metals by heat, as in the lamp filament; by light striking certain metals, as in the photo-electric cell; by the impact of projected electrons, and by other methods not important to this discussion.

BASIC DEVICES IN TELEVISION

The three devices which are so important in television are the vacuum amplifier tube, the photo-electric cell, and the cathode-ray tube. Each utilizes electrons, but in different ways. Without all three devices, television of the modern type would be impossible.

The Vacuum Amplifier Tube

The vacuum amplifier tube is essentially a triode tube. Present-day types have additional electrodes for increased efficiency for certain functions. A triode consists of a filament, a grid, and a plate contained within a vacuum tube. The grid is placed between the other two electrodes. Electrical contacts in the base for each electrode are provided.

The theory of operation of a triode is this: When a current is passed through the fine-wire filament, the filament becomes very hot, causing the electrons therein to be freed. These freed electrons tend to travel in all directions away from the filament. By impressing a relatively high voltage between the filament and the plate, a high positive charge is set up in the plate which strongly attracts the electrons, causing them to flow from the filament to the plate.

The electrons must pass through the grid to reach the plate. If a small voltage be impressed between the filament and the grid, a positive charge is also set up on the grid which increases the attraction to the electron beam and causes it to flow even more quickly and efficiently toward the plate. If, however, the voltage between the filament and grid be reversed, and a negative charge set up on the grid, it will tend to repel the electrons. The flow of electrons from the filament to the plate is thus retarded.

It is evident that if an alternating or fluctuating current be passed through the grid, it will cause the grid to vary its charge from positive to negative and back in direct proportion to the fluctuating current. This variation in charge will also cause the electron beam to be increased or retarded in direct proportion to the fluctuating current.

The variation in the speed of the electron beam will vary the current flowing in the plate. This latter current may be made to be of much greater intensity than the current being passed through the grid by impressing a high voltage between the filament and the plate. The electron beam simply increases and decreases this current. Thus the plate current is directly proportional to the grid current in fluctuation and of larger intensity. In this manner, the triode has been made to amplify the current.

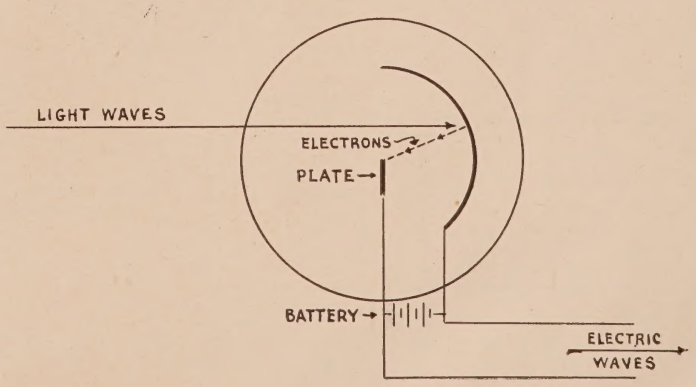
A vacuum amplified tube such as a triode can be made to do several things, depending on the type of circuit in which it is employed. It can be made to act as a relay, an amplifier tube, a rectifier for changing alternating current to direct, and an inverter changing direct current to alternating current.

This article by James Frank, Jr., has been condensed from the first three and last of a series of thirteen articles appearing, from October, 1943, to October, 1944, both inclusive, in the International Projectionist, from which permission to reprint both text and illustrations has been granted.

Photo-Electric Cell

There are certain kinds of metals which emit electrons if exposed to visible light. It has been shown that all metals will

FIGURE 1.—A photo-electric cell is a vacuum tube in which a cesium-coated cathode (negative electrode) and an anode (positive electrode) are placed. The cathode is generally semi-cylindrical in shape, with the cesium coating on the concave surface. The anode is generally placed at the center of the cathode's curvature. The degree of sensitivity of these cells may, in many cases, be very much increased by filling the tube with certain inert gases.



emit electrons if exposed to certain types of light, many invisible, but with varying degrees of sensitivity. The metals of the alkalis—lithium, sodium, potassium, rubidium, selenium, and cesium—are very sensitive to light. When light is directed at thin surfaces of these metals, photo-electrons are emitted, the quantity and speed of which depends on the intensity of the light.

A photo-electric cell (Figure 1) is a vacuum tube in which a cesium-coated cathode (negative electrode) and an anode (positive electrode) is placed. The cathode is generally semi-cylindrical in shape with its cesium coating on the concave surface. The anode is generally placed at the center of the tube and at the center of the curvature of the cathode. A small voltage is impressed between the cathode and the anode, so that the anode becomes positively charged and attracts photo-electrons. Then, as light is directed at the cathode or photo-sensitive surface, photo-electrons are caused to be emitted in proportion to the intensity of the light. These photo-electrons flow in a beam toward the anode and cause a fluctuating current in the cathode-to-anode circuit in proportions to the variation in the light intensity. The electric current produced is very small in intensity. The sensitivity of these cells may, in many cases, be very much increased by filling the tube with certain inert gases.

Cathode-Ray Tube

A cathode-ray tube is one in which a stream or beam of electrons is created by a heated cathode or filament. This beam is caused to move with great rapidity along the tube by one or two anodes. The beam may also easily be controlled by both electromagnetic and electrostatic fields so that it can be both focused and deflected. Certain types of cathode-ray tubes may also include a grid similar to that in a triode, whereby the electron beam is controlled in intensity by impressing the fluctuating current on the grid.

THEORY OF TELEVISION

In order better to appreciate television communication, let us first view briefly the simpler form of radio communication.

The function of the radio transmitter is to excite or effect the medium or space between the transmitter and receiver antennas by means of electric currents which in some way represent the intelligence being transmitted. The function of the receiver is to detect these disturbances, translate them back into electric currents like the ones at the transmitter and then convert the currents to the form of intelligence which they represent at the transmitter.

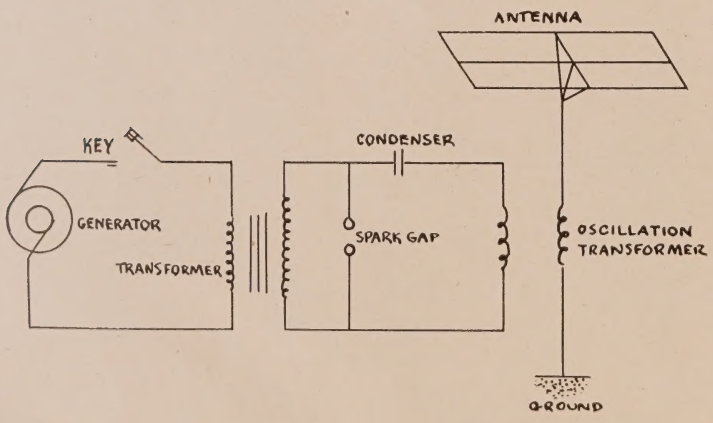
The transmitter consists essentially of three parts: (1) the generator, used to generate or create the particular form of electric currents required; (2) the modulator, the device that controls or governs the generated currents in such a way as to represent the form of intelligence that is being transmitted, and (3) the antenna, radiating the modulated currents into space.

The Generator

The generator in a radio transmitter is similar to that used for developing alternating current for electric light and power, except that the current generated is of considerably higher frequency. We are accustomed to thinking of electric power in terms of frequency of 60 cycles a second. That means that the current has 60 pulses of flow in each direction a second. The currents that are used in the antenna, however, have a frequency of thousands and millions of cycles a second.

The ordinary radio-broadcast frequency band in the United States is from 550,000 cycles (550 kilocycles) to 1,600,000 cycles (1,600 kilocycles) a second. Television employs still higher frequencies, of the order of 50,000,000 cycles, and laboratories are even experimenting with frequencies of more than 1,000,000,000 cycles a second.

FIGURE 2.—The typical connection scheme of a radio telegraph transmitting station is diagrammed here. No current will flow in the antenna except when the key is closed. By varying the length of time that the key is closed, dots and dashes are transmitted. In radio telephony, the high-frequency electric current is fed to the antenna continuously, but it is varied in intensity, or strength, in accordance with the sounds to be transmitted.



Function of the Modulator

The modulator is that part of the system which controls the high-frequency alternating currents in the antenna and so modifies them that they represent intelligence.

In the case of radio telephony, the high-frequency electric current is fed to the antenna continuously, but it is varied in intensity or strength in accordance with the sounds to be transmitted. To do this a microphone is employed, because it is able to convert the sound waves which strike it into directly proportional electric currents which vary in exact representation of the sounds. The minute currents from the microphone, after being suitably amplified, are then used to control, or modulate, the generated currents fed to the antenna by the generator, thus causing the antenna currents to be representative of the originating sounds. To accomplish this, the amplified alternating currents created by the microphone are added to and subtracted from the generated currents.

Figure 2 shows the typical connection scheme of a radio telegraph transmitting station. It is evident that no current will flow in the antenna except when the key is closed. By varying the length of time that the key is kept closed, dots and dashes are transmitted. Figure 3 shows in a similar manner a radio telephone transmitting station. Of course, the microphone is not directly in the antenna circuit in practice, but is coupled to it through amplifiers. Here the current may be seen flowing in the antenna, being modulated by the microphone. Figure 4 illustrates how an alternating current from a microphone modulates the constant high frequency antenna current. It may be noted that with the microphone inoperative, the antenna current is of constant intensity, the wave forms being of uniform height. The height of these wave forms is increased and decreased by the microphone current.

The reception of the radio waves involves the generating of electric currents in the receiving antenna when it is struck by the traveling waves of varying strength. These currents, after being suitably amplified, actuate the loud-speaker, which is a device to convert these electric waves into the same sound waves that reached the microphone.

Basic Sight-Sound Differences

In both radio telegraphy and telephony, intelligence is transmitted by modulating the flow of electric current of high frequency in an antenna.

In considering television communication, it is apparent that the form of intelligence to be transmitted is of a vital nature. Therefore, a way must be found of controlling, or modulating, the high-frequency or radio-frequency current generated to the antenna in some way which can represent the picture to be transmitted. This is where we encounter the basic difference between sight and sound transmission.

In sound broadcasting, we have to transmit only one thing, one bit of intelligence, one sound at a time, with others in sequence. Music or speech consists of merely one sound at a time,

irrespective of how complex each sound may be. Various tones may compose it, but it has only one sound, and it can be represented by only one current. An instant later, another sound can be represented by another current, and we can thus transmit faithfully by radio a progression of single instantaneous sounds.

A picture, however, even on an instantaneous flash, is not a single thing of any sort, and certainly cannot be described or represented by one electric current or one anything else. It is composed of many little elements, one for each area of that size which the eye can just distinguish. For example, if we look at a scene the dimensions of which are 10 feet (120 inches) on each side, from a distance at which the eye can just distinguish objects one inch in diameter, there are nearly 15,000 (120 times 120) small, one-inch square areas which must be described individually to convey the whole picture. The description probably will be in terms of light intensity.

Still vs. Moving Transmission

Television, the transmission of moving scenes, requires transmission of many separate pictures each second. Just as in motion pictures, it is necessary to transmit individual still pictures with sufficient successive rapidity to make use of "persistence of vision" by which the spectator is given the illusion of a continuously moving scene.

Sound motion pictures are projected at the rate of twenty-four different still pictures a second. To obtain comparable results in television, therefore it is necessary to find a way to transmit at least two dozen pictures a second—to send out information about each small element of each picture, repeating the process many times each second.

There in a nutshell we have the primary cause of practically all the television engineering problems. It may be described as a requirement of transmitting an enormous amount of information with great accuracy in a very short space of time. Let us now see how this may be accomplished.

Of course, we have only light to start with. Any object or scene is visible because of the light waves which are reflected from it to the eye. For television we desire to capture these light waves with some kind of device which will convert them into electric waves which can then be used to modulate, or control, the radio currents a generator feeds into the transmitting antenna. The best way to convert light waves into electric waves is by means of some sort of photo-electric device.

There are two different devices in television used to convert light waves into electric waves—the iconoscope and the image dissector—which are comparable to the microphone in sound transmission.

The Iconoscope

The iconoscope described here is the pick-up device used by the Radio Corporation of America in its television system.

The iconoscope has two main parts. One is a plate upon which is focused, by ordinary optical means, the scene to be televised. It corresponds exactly to the plate of film in a photographic camera; however, its surface is covered not with a photographic emulsion but with microscopic light-sensitive elements, or photo-electric cells. Each one separate from the other, generates electric voltage when light strikes it, with the voltage being proportional to the strength of the light.

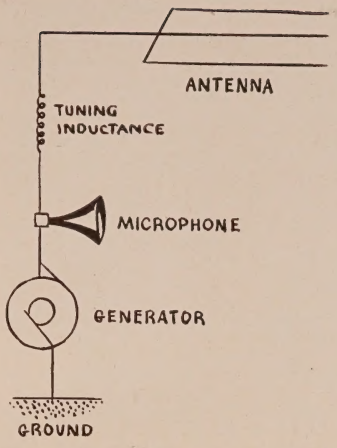


FIGURE 3.—A radio telephone transmitting station is shown in the manner of Figure 2. Of course the microphone is not directly in the antenna circuit, in practice, but is coupled to it through amplifiers.

When a picture is focused on this plate, with various parts of the picture at various degrees of brightness, the tiny photo-electric cells that have no light upon them generate no voltage; those with bright light upon them generate a strong voltage, and those with an intermediate degree of light, of course, generate an intermediate voltage. The problem, then, is simply to collect the various voltages off the plate in order to use them.

One method of doing this might be to employ some sort of mechanical system which causes a tiny wire to brush against the plate and sweep all over it with uniform strokes, thus making contact with the whole area bit by bit. However, since it is necessary to sweep the entire plate so fast and so many times a second, it is impossible to devise any mechanical system light enough to be so moved. So, a brush which has no measurable weight—a beam of electrons—is used for this purpose.

The second main element of the iconoscope is an arrangement for generating this small beam and directing it so that it falls on the plate in one tiny spot. Other electric arrangements cause this spot to move all over the plate, in regular fashion, sweep by sweep. The greater the number of sweeps (called lines) the more accurately will the picture detail be reproduced. However, the more lines used, the more information has to be transmitted in the same length of time, and this makes it more difficult. The number of lines chosen, therefore, must be a compromise between the opposing factors of desired picture quality and possible apparatus effectiveness.

Electron "Searchlight" Beam

The little electron "searchlight" beam, sweeping across the plate with its regular brush strokes, acts just as a wire brush would, and collects electricity from the cells on the plate as it passes over them. The electron beam sweeping across the plate hits at any one moment only one little spot, which, incidentally, is smaller than a pinhead. After the beam has completed its travel all over the plate, it comes back to the starting point to collect the voltage subsequently developed. In fact, the beam sweeps across the entire plate thirty times a second, collecting electricity wherever there is any present—which means, of course, wherever there is any light.

The electron beam originates in that part of the iconoscope called the electron gun or cathode. The cathode is covered with certain chemical compounds which give off electrons when heated, and the cathode in the iconoscope may be heated readily by a current, just as a lamp filament. Therefore, the cathode is a part of the electron beam; and if we connect the cathode and the plate to external apparatus, we can draw off the electricity which the beam collects from the plate having the light image focused upon it.

The electric currents thus obtained from the image plate by the electron beam are, of course, very small. But they can be amplified to useful intensities, and then we would have currents carrying intelligence representing the light pictures; and these currents can be used to control the transmitter antenna current.

In short, we have a system which is operating to pick up scenes, a spot at a time, and covering these spots so quickly and the whole scene over and over again so many times a second, that if we arrange a reproducing system to act in reverse fashion and to deliver light images corresponding to the spot currents, our very slow human senses will not follow the details of the process and will perceive only the average total result, which is the completed picture.

Image Dissector

The image dissector is the basis of the Farnsworth television system. In this device, the picture to be scanned is focused through an ordinary camera lens upon a translucent, photo-sensitive cathode located at one end of a cylindrical glass tube. As the whole scene falls upon this cathode at once, myriad electrons gyrate backwards through the tube toward the anode.

The focusing coils around the outside of the tube straighten out the electrons and move them in orderly, parallel lines, so they end up raining upon the anode with a distribution of electrons corresponding to the distribution of light intensity upon the cathode. There is a small aperture in the center of the anode which corresponds to the hole in a scan-

ning disc. The scanning is accomplished by causing electric currents to pass through the focusing coils in a way that will displace the electron image at the anode in a regular order and will permit the constantly flowing, variable stream of electrons to flow through the aperture and fall upon another electrode which amplifies their effect. This method is known as the "direct pick-up" scanning system, since the projected image of the scene to be transmitted causes electrons to be emitted and moved in a stream on the anode during the entire scanning period. The resultant amplified current is then similar to that leaving the iconoscope and is similarly used to modulate the transmitter antenna current.

Operation of Receiver

Let us consider the television receiver, but with the clear understanding that it is only a part of a system.

The television-receiver antenna is energized by the traveling waves which cause corresponding currents to flow from the antenna to the receiver. These very small currents are amplified by vacuum tubes, and, when of a useful intensity, they operate a device designed to convert them into light images, This device is known as the kinescope or oscillight.

The receiver tube has a plate with a beam of electrons playing upon it just as does the pick-up tube. In the receiver, however, the plate, or screen, is actually the distal end of the tube itself, made nearly flat, and coated on the inside with a very thin layer of fluorescent material, which gives off light wherever the electrons strike it. Some fluorescent materials will glow for some time, but the peculiar compound chosen permits the glow to die out shortly after the electron beam moves away and before it returns again.

The tiny electron beam in the receiver tube, whenever it is not moving, and, therefore, striking the screen in one spot causes a bright glowing spot on the screen at the point of contact. This spot is about the size of a pinhead. Although the glow is really on the inside of the tube, it is visible on the outside because the end of the tube is clear glass, and the screen of fluorescent material is very thin. The brightness of the spot depends on the strength of the electron beam and varies as the strength of the beam varies. That spot of light is used to reproduce each spot of the picture, one at a time, by moving around all over the picture area. It must be moved in exactly the same way that the pick-up tube beam is moved, which, in the modern systems, is in horizontal parallel lines from top to bottom. As this beam moves all over the picture in regular fashion, and repeating the circuit thirty times a second, it varies in brightness continually, "painting" the highlights and shadows of each tiny element of the picture. To our slowly reacting human eyes, the spot will not be visible because it is moving so fast, but we must remember that, actually, the light and the scenes are caused by one tiny spot of light, flying over the screen and varying in brightness as it goes.

Much of the receiver apparatus is for controlling the movement of the beam: feeding to it the currents which have been received from the transmitter in order to vary the strength of the beam and, therefore, the brightness of the flying spot. The beam of the receiver tube and that of the pick-up tube many miles away, must be accurately synchronized and kept in perfect step. Thus it is that a picture image, optically focused on the plate of a pick-up tube, is reproduced on the fluorescent screen of the receiver tube.

SIGNIFICANT STANDARDS

Many requirements of a technical nature must be satisfied before television can occupy its destined place in the electronic arts. It is desirable to consider the more important so that the reader will be able better to appreciate the present state of the art as well as some of the obstacles that have had to be overcome and how television is really possible.

As in motion pictures, the degree of technical perfection of the reproduced image may be measured in part by the detail it contains. To produce a system that will transmit and reproduce pictures of acceptable detail has been one of the most severe problems in the development of television.

The amount of detail that can be transmitted by a television system depends upon the number of picture elements resulting from the scanning process. The number of picture elements, then, depends upon the number of horizontal lines by which a complete picture is scanned. A picture element is substantially round and has a diameter equal to the distance between the centers of the adjacent scanning lines.

Rate of Scanning

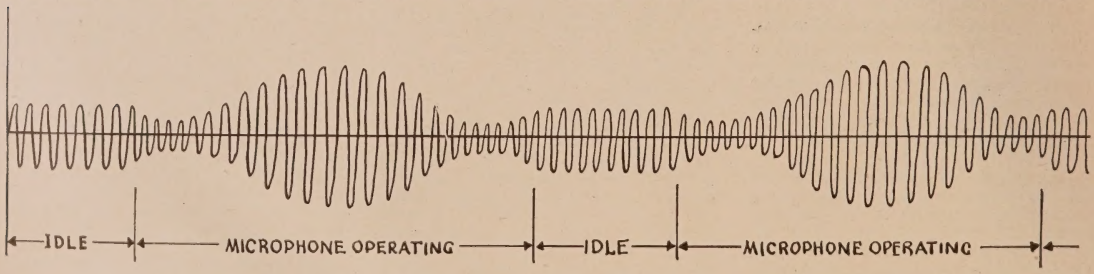
As a yardstick in determining comparative definition, it is interesting to note that photographs reproduced in the better newspapers are made up of approximately 4,000 picture elements to the square inch. Rotogravure pictures of excellent quality have as many as 10,000, and the half-tone illustrations in this publication range between 10,000 and 14,400 picture elements to the square inch.

As mentioned previously, there must always be a compromise between picture definition and equipment potentialities. During the experimental stages of television the number of scanning lines (horizontal) to the picture has been gradually increased as the apparatus was perfected. When television was first commercially introduced in 1940, a picture with 441 horizontal lines was used. Shortly thereafter, when various groups in the industry created serious agitation for reconsideration of standards, a detailed study and analysis of all of the problems involved was made, and a standard of 525 lines was established. This, however, is specifically limited to black-and-white images, as a different standard may be desirable for images in color.

Images with 525 horizontal lines compare very favorably in quality with images of equal size projected from 16-mm. film. (Figure 5.)

In television, as in motion pictures, two considerations are involved in determining the rate at which the scanning operation must be repeated. The rate of repetition must be enough to give the appearance of reasonable continuous and natural motion in the reproduced scene, and must be great enough to minimize unsteadiness, or flicker, in the reproduced picture. Continuity of motion may be maintained with a repetition rate of 16 pictures or frames a second. This is the rate used in the days of the silent motion picture. At least 48 frames a

FIGURE 4.—How an alternating current from a microphone modulates the constant high-frequency antenna current is shown here. With a dead microphone, the antenna current is of constant intensity, the wave forms being of uniform height. The height of these wave forms is varied by the microphone current. The reception of the radio waves involves the generating of electric currents in the receiving antennas when it is struck by the traveling waves of varying strength. These currents, after being suitably amplified, actuate the loudspeaker, which converts these electric waves into the same sound waves that originally reached the microphone.



second are required, however, to minimize flicker unless some artifice be employed.

Persistence of vision is that characteristic of the human eye which causes a retinal image to remain for a short period of time after the actual image focused on the retina of the eye is changed. In other words, the human eye reacts comparatively slowly, so that if the images on the retina be changed with sufficient rapidity, an impression of continuously moving pictures is created.

Motion pictures are projected at the rate of 24 frames a second at the present time, and the artifice to reduce flicker, and also solve certain mechanical problems, takes the form of an additional blade upon the projector shutter that interrupts the light while the film is being moved, or while one picture is being pulled down and the next one moved into place for projection. Thus, as far as flicker is concerned, the projection is in effect 48 frames a second, each still picture on the film being projected twice, since the light is cut off twice by the two-blade shutter, once while the film is moving and once while it is standing still.

Such an artifice is not applicable in television. Some other method must be devised. Interlaced scanning is employed to provide satisfactory freedom from flicker. In this procedure, instead of scanning the picture in adjacent horizontal lines from top to bottom, alternate lines, or every other line, covering the entire area of the picture are first scanned and then the beam returns and scans the omitted lines. The entire picture is scanned 30 times a second, but the picture is covered in alternate lines 60 times a second. This arrangement is most desirable to eliminate flicker because it permits pick-up from motion-picture film which must be run at the standard rate of speed to permit suitable reproduction of a standard sound track.

There is another requirement in television which affects the frame frequency. This is the relation that should exist between the frequency of the power supply to both the transmitter and the receiver and the repetition rate. It is desirable that the repetition rate be an integral divisor or multiple or sub-multiple of the power-line frequency. This is necessary in order to minimize certain non-synchronous interference effects which otherwise might be detrimental to the picture.

Television transmitters and receivers are designed to operate in this country on a 60-cycle, alternating-current power supply. Thus, a frame frequency or repetition rate of 30 frames a second fulfills the requirements, whereas 24 frames a second would not. This is the smallest sub-multiple of 60, the double of which is above the maximum flicker frequency observable by the eye (48 frames a second).

Transmission Data

The transmission electrically of high-definition images over a single channel, cable, or radio requires very wide frequency band apparatus and circuits. This is occasioned by the rate at which information must be transmitted relating to brightness of a very large number of picture elements.

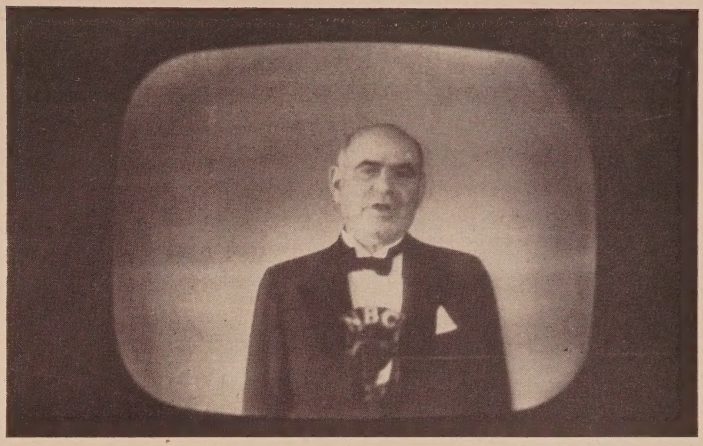


FIGURE 5.—Images with 525 horizontal lines compare very favorably in quality with images of equal size projected from 16mm. film, as is evidenced by this photograph from an actual television image. In television, as it is with motion pictures, the scanning rate must be sufficiently rapid to give the appearance of continuous and natural motion in the reproduced scene and to minimize unsteadiness or flicker in the reproduced picture.

For example, a television image with an aspect ratio (the relation of the length to height) of 4 to 3 will contain about 250,000 picture elements. This is determined by the square of the number of lines times the aspect ratio. For an image with 525 lines with equal horizontal and vertical resolution, or detail, there would be more picture elements than 250,000, but when the standard was changed from 441 to 525 lines, it was recognized that, to maintain the picture elements at about 250,000, there would be some sacrifice of horizontal resolution while fine vertical resolution has been preserved.

When 30 pictures a second are scanned, information must be transmitted concerning the brightness of 30 times 250,000, or 7,500,000 picture elements a second must be transmitted. The total frequency band required for transmitting a picture as described above is about 4,000,000 cycles a second, or about 4 megacycles a second.

Four megacycles a second is the width of the frequency band to accommodate the highest frequency television signal that must be amplified and carried by the apparatus and circuits in the television system. It is that frequency band by which the carrier-wave, or antenna current, of the radio transmitter must be modulated. The total radio transmitting channel will be 8 megacycles when the carrier is modulated by the picture signal, 4 megacycles above the carrier and the same number below. This is equal to the combined widths of 800 sound broadcasting channels of 10,000 cycles a second each.

Channels of such great width are not available in the frequency spectrum or range now used for radio services. For this and other reasons related to technical requirements, the ultra-high frequency—or ultra-short waves—are used for television. Frequencies above 30 megacycles, equivalent to below 10 meters (number of cycles a second times number of meters always equals 300,000,000) are employed.

Ultra-short waves have properties in propagation similar to optical waves. The range over which satisfactory high definition television pictures may be reliably transmitted by ultra-short waves is limited practically to the distance of the horizon from the height at which the transmitting antenna is placed. Under some abnormal conditions, pictures may be received over greater distances for periods of very short duration, but primarily television stations will serve local areas. The signals from the stations in these local areas will be stable and will have about the same intensity during the day and night hours and during all seasons of the year.

The explanation of this relatively short distance of satisfactory transmission is that these very short radio waves are not reflected by the heaviside layer. The heaviside layer is a layer of air, filled with electrons and ionized gas molecules, which acts like a good reflector for electromagnetic radio waves. It is located about 100 miles from the earth's surface, and its height changes with sunlight conditions. It is higher at night than in the day time.

Radio waves of the order of the regular broadcast band (550 to 1600 kilocycles a second) are reflected and may thus be transmitted over long distances, being reflected from the heaviside layer to the earth and back a number of times. Television waves are not reflected by the heaviside layer, so that only direct waves are useful.

In order to economize on the use of the frequency band required, "vestigial side band" transmission is used. In this system, the partial elimination of one side band is achieved by the use of band-pass filters which have a range of partial transmission in the range on

either side of the transmission band.

To explain the vestigial side band transmission, it should be recognized that one side band by itself carries all the characteristics of the signal, no more intelligence is carried on the other band but simply more power. Thus, if advisable, we may partially eliminate one side band, leaving enough of it to avoid certain distortions. This is called vestigial side band transmission and has the advantage that the width of the frequency band required for the channel may be decreased to approximately five-eighths of that required by the ordinary double-side band method. (Figure 6.)

It has been found desirable to transmit the picture and sound in the same television channel. This permits the use of a single oscillator for both sight and sound in the superheterodyne television receiver, thus greatly simplifying the tuning. In this system, the sight and sound signals are separated by selective circuits in the intermediate frequency amplifiers.

It would be well again to consider the necessity for considering the television receiver as an integral part of an entire system. This is in contrast to sound broadcasting. Television receivers must be designed for transmitters which operate on well-defined standards. If changes are made in these standards, all television receivers might become obsolete or might have to be modified. This is one important reason why so much time and money have so far been spent to develop television to a practical commercial stage before its introduction has been too widespread.

Frequency modulation, the standard for television sound, is a system for broadcasting which differs from amplitude modulation, in that the frequency of the carrier wave of constant amplitude is modulated or varied by the sound to be transmitted.

The advantages of frequency modulation over amplitude modulation for the transmission of the sound has proved to be so great in terms of clarity, dependability, and economy of transmitting powers that this standard has been adopted. The use of frequency modulation is well adapted to the purpose particularly as ultra-short waves are being used anyway for television transmission.

There undoubtedly will be changes to television standards transmission in the future, but it is safe to say that enough thought and study has been given to the matter of standards by all of the engineers of the industry to permit the widespread introduction and expansion of television.

CONCLUSION

The "why" of television has been described in as simple language as practical. There have not been very many radical changes in the art of transmitting and receiving since the beginning of the war. While a number of important improvements have no doubt been made to individual parts of the system, not much has been yet said about them. We will now summarize some of the general problems as they now exist with an attempt to forecast certain of the general trends.

One of the most serious problems at the present time involves a controversy regarding standards. During the past several years new improved vacuum tubes have been designed which make possible the satisfactory transmission of television signals over radio frequencies much higher in the spectrum than have heretofore been used. To adapt television for this new portion of the frequency spectrum would, however in the opinion of many engineers, require a considerable amount of additional development work.

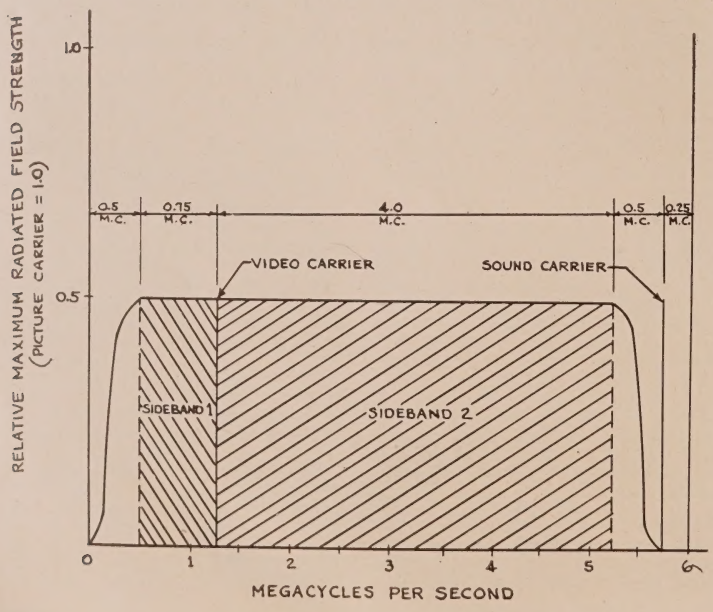
Most of the companies with television research facilities that have been engaged almost solely in producing electronic equipment for the war effort have just recently been permitted to devote much time to television. The present controversy, therefore, arises around the question as to whether plans should be made for introducing television commercially in this country in accordance with present standards. The exponents of this plan suggest that as television systems utilizing the higher frequencies are perfected a gradual transition should take place so that ultimately all transmitters and receivers would operate in the higher portion of the frequency spectrum.

The exponents of the other side of the argument advise delaying introduction of commercial television until the systems have been perfected for use in the higher frequencies. There seems to be considerable differences of opinion as to whether this involves a delay of approximately a year or as much as five years. By following the second plan, it will prevent the introduction and sale of equipment, which might become obsolete within a few years and require costly replacement. Another point, however, is the harm that might arise by delaying for such a long period of time the commercial introduction of television.

One of the interesting phases of this controversy is the fact that those favoring delay are, in general, concerns which have not very much invested at the present time in manufacturing facilities or transmitters and who would, therefore, suffer least by such a delay. Only recently the Federal Communications Commission, based on recommendations from various groups in the industry, decided to follow the second course.

Summarizing, I think it is safe to say that, from a technical point of view, television has for the most part reached the point where it is ready for commercial introduction. Apparently the perfection of color television is several years off. Undoubtedly, ultimately the use of the higher frequencies for television than have heretofore been used will become an accomplished fact. The several commercial problems regarding both home and theatre television will, of course, have to be solved, but it is encouraging to note the progressive interest and activity on the part of many people in the industry to insure the accomplishment of this objective in the not too distant future. It appears certain, as well, that the engineers of the various television manufacturers are now ready to devote their full attention to the further development and perfection of television.

FIGURE 6.—In "vestigial side band" transmission the partial elimination of one side band is achieved by the use of band-pass filters. Accordingly, only one side band carries all the characteristics of the signal, the other side band carries merely power. Thus, the width of the frequency band required for the channel may be decreased to approximately five-eighths of that which is required when the ordinary double side-band methods are used.



American Theatremen Consider Television

Potential Theatre Use and Value of Video Are Considered in a Survey of Executives

Despite the volumes that have been written on television in relation to the American motion-picture theatres, the what's what so far as United States theatre owners is concerned is still a matter for conjecture. Accordingly, an effort was made to determine precisely what shape that conjecture was taking, and circuit executives representing 5,472 of the United States' 16,891 were asked their opinion in the potentialities of theatre television.

Because of the probable costs involved, it was felt that theatre television would come first to the circuit theatres, despite the fact that, in other developments in the physical theatre, it has been the independent operator who took the lead. Replies were received from executives representing 4,448 circuit theatres.

Inasmuch as the original inquiry, and the replies, too, were by so many considered "off the record," what follows is not tied up with any particular individual, but rather represents a consensus of the replies received.

In the first place, it should be pointed out that the term "theatre television" as here used is strictly limited to mean a television presentation transmitted for use in theatres only and not available, off the air, to home viewing. It seems that some executives rightly question the desirability of using in the theatre what the home set owner may receive in his own parlor. There are, of course, certain events of national interest—such as a presidential fireside chat or an address of, for example, the Prime Minister—which would be common property and available to all, such to be used as some theatres did the radio addresses of the late President Roosevelt.

THEATRE TELEVISION

Theatre television means potential box-office in the exclusive coverage of major sports events and occasions of national importance, because of the fact that the theatre industry is in a position to outbid any commercial sponsor.

The potential drawing power of theatre television is, of course, dependent in a large measure on its ability to produce visual entertainment up to a quality and technique of present-day motion-picture production and personalities, except for spot-news value.

The television of events from a theatre standpoint would be about the only real important thing. There is little reason why it should make any difference to a theatre audience whether that in which they are interested comes into the theatre through television or through a motion-picture projector—they are only interested in what they see, not in the method by which they see it.

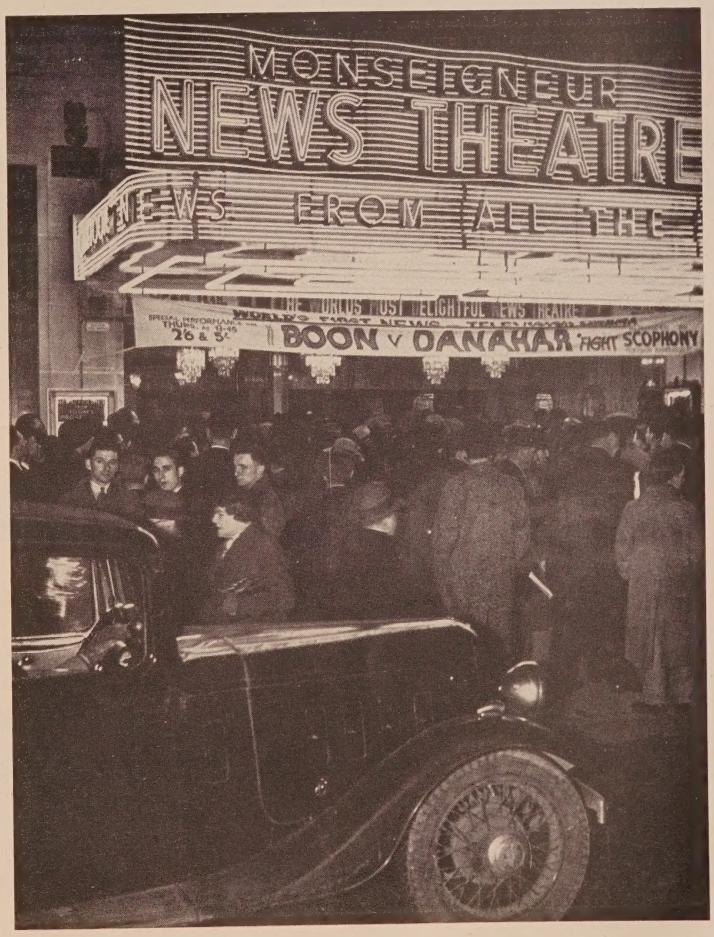
Thus, the potential drawing power in a theatre depends on the ability to give a better performance, or to create a greater medium of assembly than others on the stage or screen. It is merely a matter of entertainment material, and if televised programs ever reach the entertainment standard of present motion-picture technique, then it would make little difference which method is used.

Undoubtedly, television as a part of the theatre program would attract much interest while it is new and novel. Being able to present to the theatre audience events of unusual interest—at a time when it could be announced and exploited in advance—would draw an unquestionably substantial attendance.

With regard to television versus motion pictures, the former will not be an opposition to the latter, but, rather, an adjunct. In the long run, television will help the motion-picture business to a much better job than it is doing at present. Indeed, it may even react the same way that the talking picture did years ago.

Nor will television in the home materially detract from theatre attendance; rather it may actually develop stars and attraction which will be beneficial to the theatre attendance as did radio when it developed stars who built followings from their radio shows and, in turn, became drawing cards for theatres.

EVEN AS CROWDS HAVE ALREADY JAMMED the Monseigneur News Theatre in London, so the American exhibitor, especially in the larger centers, looks for similar crowds when television shall have become a standard box-office attraction. As has been found from experience in England, so also the U. S. theatre operators anticipate that in the future televised sports events will be a major attraction. (Scophony Corporation of America photograph.)

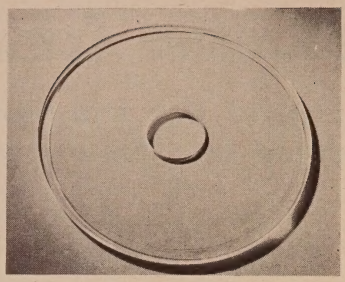


But one thing is certain, television will not hurt show business any more than radio did. So long as people want to be together—and they always seem to want to be together, as proved by crowds at football games and all events of similar character—theatre business as a form of entertainment will not be affected at all.

Television should draw well to begin with, and, with big-money attractions to follow, maintain its drawing power. In the first place, there should be the beneficial effect of something new. The new and novel in entertainment has in most instances proved beneficial to gross receipts. However, the attraction of the new and novel under present-day conditions has a shorter life than in the past. Scientific progress has been so rapid during the past ten years that the American people have become accustomed to rapid changes and take such changes in their stride.

The features of television will be forthcoming to theatres within a very few years and, naturally, later on as the success of these special attractions make records for themselves, it might have a telling effect upon the future distribution of programs to theatres. Assuming, too, that the technology of television both in transmission and reception is developed to a point where it is practical and possible to provide a television picture on the screen of a motion-picture theatre, it will have a two-fold effect on the boxoffice receipts of these theatres.

There is, of course, one tremendous field for television in theatres and that is the broadcast of national functions, sports, and news events. One's imagination can travel without limit when one considers the box-office potentialities of a televised Rose Bowl game, the Kentucky Derby, or a championship prize fight.



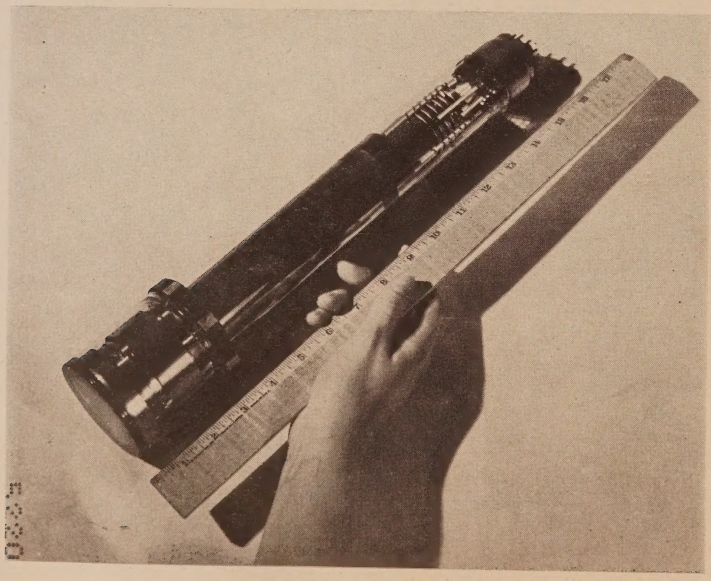
THE ASPHERICAL CORRECTING LENS, made of Lucite (product of the E. I. duPont deNemours and Company, Inc.) for use in the RCA Victor projection television receiver, may be another development of wartime research which will lead sooner to theatre television. The plastic lens fits over the neck of the cathode-ray and is used to bring the image to a sharp focus in the receiver's viewing screen. (DuPont photograph.)

While many feel that there will be a real audience feature in these screenings—even the showing of outstanding disasters when they occur—others there are who think that rehearsed events will, as the technique of presentation improves, have its draw.

As a side light to news on the theatre's television screen, some executives anticipate the day when a camera crew, using 16-mm. film and sound equipment, will venture forth in a city like New York or Los Angeles and shoot a lot of news events during the day, cutting the film and giving it to audiences of neighborhood theatres by way of television from a central studio. In this way, production costs could be spread rather thinly over many theatres.

All in all, television in the theatre has possibilities of a strong drawing power and is an addition which many theatres will want to make when this service becomes available.

THE IMAGE ORTHOCON TELEVISION CAMERA TUBE represents a new development that may bring more and better television pictures to American theatres. The new tube, developed by engineers of the Radio Corporation of America, is so sensitive that it will pick up scenes illuminated only by a match or a single candle. The tube is adapted to picking up outdoor events where the natural light is not always of the best. (RCA photograph.)



WARNING TO INDUSTRY

In making predictions as these, it must be assumed that the motion-picture industry will use the potential drawing power of its box office, as well as its talent control, to see that the major television entertainment will not be given away through home-owned outlets, but rather sold to the public through the theatres of the nation.

If the motion-picture industry does not take advantage of this fact, it is inviting future home-owned competition which will be an actual threat to the theatre business. When radio first started, theatres were alarmed as to its power to keep people home and away from the theatre. However, as radio became more commonplace, the superiority of the visual-local entertainment offered at the theatre overcame this threat. We must remember that television will offer every home in America the opportunity to have visual, as well as vocal entertainment. The motion-picture industry has the power to see that this phase of television becomes a minor type of entertainment and a feeder for the theatres. It is to be hoped that the motion-picture industry will recognize the potential box office of theatre television and make its plans accordingly.

While theatre television has been proved feasible—experimentally in this country and commercially in England—it will not be a matter of days until the American theatre can be equipped. Rather, will it be a matter of many months and possibly years, for there are many problems yet to be ironed out.

SOME EQUIPMENT DETAILS

The mechanics of how to use properly these telecasts will create many problems, particularly out of those arising from such factors as the time differentials in various sections of the country and in the various parts of the world and the weather conditions which may make it extremely difficult properly to televise scheduled outdoor events which have been advertised in advance.

In small towns it will probably be a long time before television will be available, not only to the theatre but to the would-be owners of home sets. It may be possible to work out an efficient way of handling a television signal on the present land-line facilities. If that happens, the whole progress of the television program will be speeded up.

Other technical details to be cleared up include the improvement of definition by increasing the present 525-line standard, and the development of a new system of lighting to deliver a television picture on the screen as bright and clear as the present-day moving picture.

Some executives have raised the question about costs, stating quite correctly that the cost of installation to bring television to theatre audiences must be considered in summarizing the advantages television might have from the standpoint of the box office.

On such details, no American manufacturer of television equipment, as was revealed in a supplementary survey, will make a statement however qualified with

ifs and buts. Yet, there is a source of information on these points, and that is The Scophony Corporation of America, whose data, however, is based on the practical experience of Scophony, Ltd., in England and in London in particular.

That American theatre men may have some sort of an idea of possible costs, the following information has been condensed from material supplied by Dr. Arthur Levey, president of the Scophony Corporation of America.

In the first place, installation of the Scophony equipment requires no structural changes in the theatre. A slight reduction in seating capacity may be expected because the equipment is not at present of such power or capacity as it can be installed in the projection booth.

In respect to the actual cost of the equipment, only an approximate guess can be offered until the post-war labor conditions and other factors are known. It might be assumed, however, that a Scophony television projector for an average theatre seating between 1,000 and 1,250 should not exceed $7,500. Installation charges are also reasonable and principally levied for labor. This charge should not exceed $200. The time required to install this equipment is from six to eight hours, although, where it has to be done, it can be set up in as little as four hours. The maintenance costs are negligible.

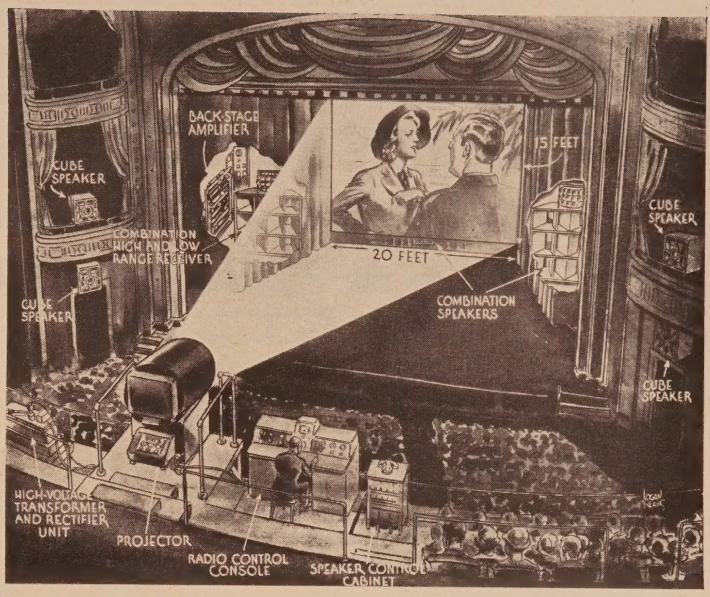
Because of the ease of control and the compactness of the gear, the average motion-picture-machine operator can familiarize himself with the operation of the television projector within a matter of a few hours.

THE FUTURE

Looking further than the theatre screen into the future, some executives visualize theatre-television networks similar to present-day networks of radio stations. Radio listeners throughout the day would be sold on the attraction of their local network television-equipped theatres and even television trailers might be used throughout the day on the home-owned television sets to build audiences for the major television attractions available only at the local theatre.

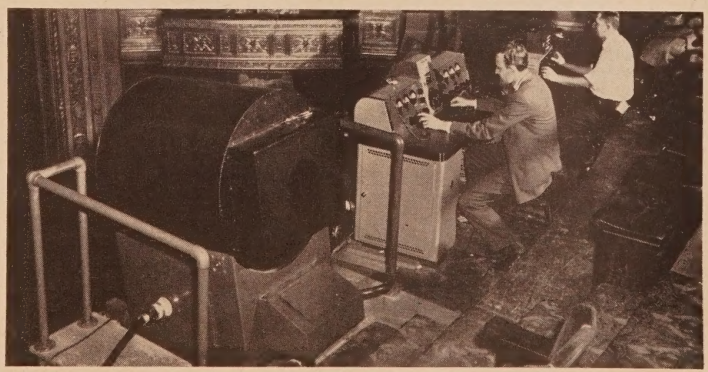
Should mechanics be worked out for a more economical medium than the coaxial cable, television may serve a greater cause on the distribution of entertainment to the theatre. Indeed, some there are who await the day when film carriers will no longer be needed and all of a theatre's product will come by wire direct from the distribution center to the projection room of the individual theatre, thus enabling the house, and thousands of others like it, to have a first-run showing of a major attraction at one and the same time, knowing that a pre-selling job of publicity has been carried on through the home-owned sets. The potential uses of this new type of entertainment transmission are tremendous.

When the time comes that the many problems of proper television presentation on theatre screen are solved—and if the cost is not prohibitive—theatre television should increase theatre attendance. How long it will take to bring about the improvements, no one can predict. It took the motion-picture more than 50 years to achieve its present-day standard.



THE THEATRE TELEVISION SET-UP, as used in a special experimental program at the New Yorker Theatre five years ago, is sketched by the artist to show the relation of the various items of equipment. The steel-jacketed projector throws a picture to cover a 15x20-foot screen. Equipment developed by the Radio Corporation of America was used in this demonstration. Future theatre television will have better models. (RCA photograph.)

TWO VIEWS OF THE ACTUAL INSTALLATION at the New Yorker Theatre, for the Radio Corporation of America's demonstration back in 1941. Comparing these fore-and-aft pictures with the sketch above, the various items of equipment can be readily identified. (RCA photographs.) Besides the RCA equipment, that of Scophony has been used in some tests in this country. As television advances, better, less complicated equipment will be devised.



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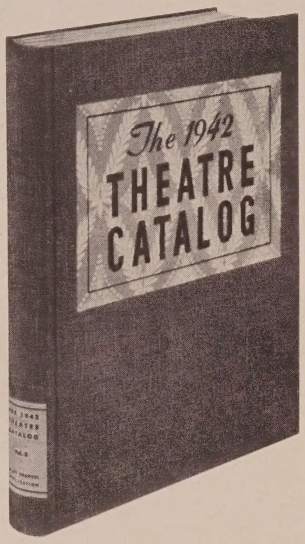

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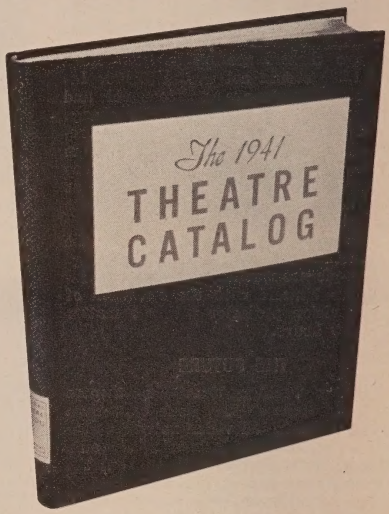

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A

Accessories, new uses for old 433
Accidents, prevention of, as insurance .. 445
what to do first in 509
Acids, antidotes for 512
Acoustics, carpets as factor in 222
Advertising, accessories for 430
banners for 431
framed displays for 430
institutional 438
marquee specials for 435
standees for 432
standing frames for 431
—, copy preparation, home-study course in 538
—, newspaper, home-study course on ... 538
—, outdoor, advantages of 440
cost of 442
general discussion of 440
—, outsize, displays in 435
—, point-of-contact, discussion of 430
—, principles, home-study course in ... 538
Air, contamination of 494
Air-conditioning, maintenance of equipment in 379
Air-diffuser(s), functions of 373
uses of 374
Air-disinfection, see Air-sterilization
Air-filter(s), see Filters, air
Air-infiltration, prevention of 379
Air-outlets, maintenance of 382
Air-sanitizing, see Air-sterilization
Air-sterilization, notes on 486
duct installations for 488, 495
GE germicidal lamps for 487
Hanovia Safe-T-Aire lamps for 488
Hygeaire system for 491
Sperti Mercolites for 489
Sylvania lamps for 489
Westinghouse lamps for 490, 495
Alapai Theatre, Honolulu, T. H. 52
Alkali(s), antidotes for 512
Aluminum, uses of 131
—, fabrics, uses of 213
Amperage, light relations to 287
Amusement(s), television as entrant in 544
Apartment, theatre design including ... 461
Apoplexy, first-aid treatment for 513
Aralac, uses of 212
Arch(es), laminated, construction uses of 4
Arlington Theatre, Arlington Heights, Ill. 181
Arm, fracture of, first-aid treatment for 514
Arsenic, antidote for 512
Art Theatre, Quincy, Mass. 210
Asphyxia, first-aid treatment for 511
Auburn Theatre, Rockford, Ill. 181
Auditorium(s), air-sterilization in 493
fabrics in 209
fire protection in 234
lighting of 219
—, obsolete, remodeling of 157
Authorities, notification of, in fires.... 540

B

Backstage, fabrics in 209
fire protection in 234
remodeling of 159
Bacteria, destruction of, in air 486
Balcony, fire protection in 234
remodeling of 160
Banners, use of 431
Baseball, television of, in theatres 546
Battery(ies), use of lead in 142
Bay Theatre 94
Beach Theatre, Virginia Beach, Va. 60
Beam(s), "searchlight," explanation of 565
Bearings, maintenance of 379
Bedbugs, control of 498
Beetles, carpet, control of..... 500
Belmont Theatre, Dayton, O. 76
Undisclosed address 99
Belts, maintenance of 380
—, flat-drive, maintenance of 380
—, v-type, maintenance of 380
Berkley Theatre, undisclosed address .. 175
Beryllium, uses of 138
Bismuth, uses of 139
Bite(s), insect, first-aid treatment for .. 515
Black-light, see Light, black
Bleeding, how to stop 509
—, internal, how to stop 510
Blower(s), maintenance of 382
Blowflies, control of 499
Boils, first-aid treatment for 515
Bonds, fidelity, insurance use of 445
Bookkeeping, forms and systems for ... 446
home-study course in 537
Booth(s), projection, construction of .. 326
decoration of 328
design of, home-study course in 538
dimensions of 326
doors of 327
fire causes in 505
fire protection in 233
floor construction in 326
inter-communication in 328
"itinerant" 130
lavatory facilities in 328
lighting of 328
planning of 326
portholes of 327
power-equipment room in 328
rewind room in 328
toilet facilities in 328
ventilation of 328
wall construction of 326
windows of 327
wiring of 327
—, ideal, plans for ..... *facing* 326
tables for ..... *facing* 326
Brass, uses of 133, 140
Bronze(s), use of 133, 140
Bruises, first-aid treatment for 515
Building, economics of 8
Burns, first-aid treatment for 513

C

Cabinet(s), first-aid, contents of 515
Cadmium, uses of 137
Camino Theatre, Pittsburg, Calif. 62
Carbolic acid, see Phenol
Carbon(s), projection, notes on 312
Carbon monoxide, first-aid treatment for 512
Carpet(s), acoustic use of 222
color in 221
daily cleaning of 224
Carpets, *continued*
design in 221
durability of 222
fluorescent effects in 221
installation check-ups on 224
location cleaning of 225
maintenance of 224
safety in 222
surface cleaning of 224
Casiino Theatre, Pittsburg, Calif..... 20
Cavalon (P.C.), uses of 215
Cell(s), photo-electric, explanation of.. 563
Cement, uses of 154
—, mural, use of lead in..... 143
Centers, recreation, post-war plans for.. 98
Centre Theatre, Baltimore, Md. 373
Undisclosed address 92
Cesium, uses of 138, 564
Chalk Hill Theatre 90
Choking, first-aid treatment for 511
Chromium, uses of 137
Cin Theatre, undisclosed address 66
Cine Teresa, Mexico, D.F., Mexico 168
Cine Theatre, undisclosed address 36
Circle Theatre, Detroit, Mich. 156
Cleanliness, pest control aided by 503
Closet(s), water, equipment for 280
Cobalt, uses of 139
Cockroaches, control of 502
Coil(s), defrosting of 381
maintenance of 380
—, air-cooled, maintenance of 380
—, cooling, maintenance of 380
—, heating, maintenance of 380
—, water-cooled, maintenance of 380
Coliseum 92
Collarbone, fracture of, first-aid treatment in 514
Colonial Theatre, Harrisburg, Pa. 508
Phoenixville, Pa. 134
Color, decorative aspects of 208
dynamics of 109
illumination and quality of 111
styling in 110
utilization in carpets of 221
Columbium, uses of 139
Colvin Theatre, Kenmore, N. Y. 465
Comerford Drive-In 104
Comfort, decorative aspects on 208
Community(ies), theatres and 2
Community Theatre, Toms River, N.J... 2
Compressors, belt-driven, maintenance of 381
—, sealed-type, maintenance of 381
Concerts, television of, in theatres 547
Concrete, maintenance of 185
uses of 154
—, architectural, uses of 155
Condenser(s), air-cooled, maintenance of 381
—, evaporative, maintenance of 381
—, water-cooled, maintenance of 381
Construction, economics of 8
metals in 131
Mexican developments in 168
pest-control angles of 503
plastic-plywood in 125
Control(s), air-conditioning, maintenance of 381
—, electrical, maintenance of 381
—, refrigerant, maintenance of 381

Copper, uses of ... 132 140
—, aluminum-foil-coated, uses of ... 132
—, lead-coated, uses of ... 133
Correa Theatre ... 94
Couplings, maintenance of ... 382
Covedale Theatre, Cincinnati, Ohio ... 78
Credo, for decorators ... 208
Crown Theatre ... 92
Current-changers, see Generators, Motor-Generators, *and* Rectifiers
Curriculum, home-study courses in ... 537
Curtain(s), asbestos, use of ... 230
—, fire-proof, use of ... 230, 231
—, screen, use of ... 230

D

Damper(s), maintenance of ... 382
DDT, use of ... 503
Dearborn Theatre, undisclosed address 175
Decoration, color in ... 208
color dynamics in ... 109
comfort in ... 208
effectiveness of, in remodeling ... 163
metals in ... 131
objects of art in ... 165
proscenium treatment in ... 231
remodeling as adjunct of ... 162
scale in ... 208
Design, carpet developments in ... 221
community planning and ... 2
home-study course in ... 537
Mexican developments in ... 168
—, functional, conception of ... 9
—, objective, conception of ... 9
Diabetes, first-aid treatment for ... 513
Diana Theatre ... 95
Dislocation, finger, first-aid treatment for ... 514
—, jaw, first-aid treatment for ... 514
Display(s), home-study course on ... 539
—, animated, use and value of ... 436
—, framed, use and value of ... 430
—, hand-painted, use and value of ... 436, 442
—, out-size, mirrors used in ... 436
use and value of ... 435
—, 24-sheet, use and value of ... 441
Distortion, screen, elimination of ... 284
Distribution, home-study course in ... 537
Drafts, cause of ... 372
elimination of ... 372
Ducts, maintenance of ... 382
Durability, development of carpets for ... 222
Dust, elimination of ... 378

E

Ear, foreign body in, first-aid treatment for ... 515
Earache, first-aid treatment for ... 515
Echo(es), elimination of ... 169
Economics, fundamentals of, in building ... 8
Electronics, principles of ... 563
Embassy Theatre, Washington, D. C. ... 30
Enamel, porcelain, advantages of ... 175
erection of ... 176
forms in ... 174
properties of ... 174
uses of ... 174
England, television in, experience with ... 552
history of ... 552
Entertainment, combined films and television in ... 561
Epilepsy, first-aid treatment for ... 513
Equipment, air-conditioning, maintenance of ... 379
—, drive-in, amplifiers ... 481
generators ... 477
installation of ... 481
lenses ... 477
notes on ... 477
Equipment, drive-in, *continued*
projection lighting ... 477
projectors ... 477
rectifiers ... 477
screen ... 477
sound systems ... 477
speakers ... 478
—, fire protection, discussion of ... 232
—, popcorn, maintenance of ... 525
use of, in theatres ... 522
—, projection, Century Projector Corporation ... 304
DeVry Corporation ... 305
generators for ... 288
International Projector Corporation 306
Motiograph ... 308
National Carbon Company ... 312
notes on ... 304
Radio Corporation of America ... 310
rectifiers for ... 286, 287
Weber Machine Corporation ... 312
—, 16-mm., maximum row length ... 484
projection distance ... 484
projection lamps ... 484
room illumination ... 484
screen ... 484
screen illumination ... 484
viewing distances ... 483
—, sound, Altec Lansing Corporation ... 313
Century Projector Corporation ... 315
DeVry Corporation ... 316
International Projector Corporation 317
Motiograph ... 319
notes on ... 313
Radio Corporation of America ... 321
Western Electric Company ... 323
Westrex Corporation ... 323
—, stage items of ... 229, 230
—, toilet, items of ... 278
Esquire Theatre, Columbus, Ohio ... 80
Evacuation, theatre, in case of fire ... 540
Exits, lack of adequate, as tragedy cause ... 506
Exploitation, home-study course on ... 539
Exploitation, see also Advertising
Extinguishers, instruction in use of ... 540
operation of ... 234
placement of ... 234
servicing of ... 235
—, carbon-dioxide, characteristics of ... 232
operation of ... 235
—, gas-cartridge, characteristics of ... 233
operation of ... 235
—, foam, characteristics of ... 232
operation of ... 234
—, loaded-stream, characteristics of ... 233
operation of ... 235
—, pump-tank, characteristics of ... 232
operation of ... 235
—, soda-acid, characteristics of ... 232
operation of ... 234
—, vaporizing-liquid, characteristics of 233
operation of ... 235
Eye, foreign body in, first-aid treatment for ... 515

F

Fabric(s) acoustic use of ... 209
auditorium use of ... 209
backstage use of ... 209
decorative use of ... 209
developments in ... 211
fire-proofing of ... 214
lobby use of ... 209
mildew-proofing of ... 214
moth-proofing of ... 214
proscenium use of ... 209
shrink-proofing of ... 214
water-proofing of ... 214
—, aluminum, use of ... 213
—, asbestos, use of ... 213
—, coated, use of ... 215
—, decorative, Fiberglas as ... 115
—, Fiberglas, use of ... 115
—, glass, use of ... 115, 212
—, laminated, use of ... 214
—, metal, use of ... 213
—, plastic-coated, DuPont products in ... 151, 215
Fiberglas in ... 115
—, protein, use of ... 212
—, stainless steel, use of ... 213
Fabricoid, uses of ... 215
Fabrilite, uses of ... 215
Fainting, first-aid treatment for ... 513
Fans, maintenance of ... 382
Fiberglas, air filters of ... 116
development of ... 112
general uses of ... 112
heat insulation with ... 113
properties of ... 113
screen use of ... 284
sound insulation with ... 113
—, mats, uses of ... 116
Fights, television of, in theatres ... 546
Films, low-reflection, methods of producing ... 299
Films, transmission, see Films, low-reflection
Filter(s), air, Fiberglas for ... 116
maintenance of ... 379
—, heat-reducing, glass for ... 295
—, vignetting, hot spot reduced by ... 294
Finger, dislocation of, first-aid treatment for ... 514
Fire(s), careless smokers as cause of ... 506
electric wiring as cause of ... 505
exposure as cause of ... 506
personnel duties in ... 540
projection booths as cause of ... 505
pyromaniacs as cause of ... 506
tragedy prevention in ... 505
types of ... 232
Fire extinguishers, see Extinguishers
Fire-fighting, general rules for ... 235
Fire-prevention, training schedule for ... 508
Fire-proofing, DuPont products for ... 151
methods of, with fabrics ... 214
Firebrats, control of ... 502
First aid, principles of ... 509
supplies for ... 515
Fits, see Epilepsy
Fixtures, plumbing, developments in ... 278
Fleas, control of ... 499
Flies, control of ... 499
Floor(s), maintenance of ... 184, 224
—, asphalt tile, maintenance of ... 186
—, concrete, maintenance of ... 185
—, hard-surface, maintenance of ... 184
—, linoleum, maintenance of ... 187
—, marble, maintenance of ... 186
—, quarry tile, maintenance of ... 184
—, reverse-incline, seating on ... 227
—, rubber tile, maintenance of ... 187
—, terrazzo, maintenance of ... 185
—, vitreous tile, maintenance of ... 186
—, wood, maintenance of ... 184
Fluorescence, carpet developments in ... 221
Flywheels, maintenance of ... 382
Football, television of, in theatres ... 547
Foyer(s), lighting of ... 218
remodeling of ... 165
Fracture(s), arm, first-aid treatment for ... 514
—, collarbone, first-aid treatment for ... 514
—, leg, first-aid treatment for ... 514
—, spine, first-aid treatment for ... 514
Frame(s), standing, use of ... 431
Freon, uses for ... 151
Front(s), remodeling of ... 165
trends in construction of ... 179
trends in design of ... 179
Fumigation, methods of ... 504
Furnishings, use of plastics in ... 152
Fuses, maintenance of ... 382

G

Gallium, uses of 138
Gammexane, use of 503
Gases, lung-irritant, first aid treatment for 512
Gauges, maintenance of 382
Generators, current characteristics of .. 283
efficiency of 290
maintenance of 289
use of, in television 564
Germanium, uses of 138
Glamour, place of, in theatre decoration 208
Glass, heat-filtering, use of 295
—, leaded, use of 143
Gold, uses of 137
Green Hill Theatre, Philadelphia, Pa... 42
Gridirons, location of 230
Grilles, maintenance of 382
Guggenheim, Solomon R., Museum of Non-Objective Painting, New York, N. Y. 9

H

Hampton Theatre, undisclosed address 26
Hardware, use of lead in..... 142
Harris, J. P., Theatre, Pittsburgh, Pa.. 175
Heating, radiant, background on..... 375
comparative costs in 377
design of 375
installation of 376
operation of 376
practical considerations in 377
use of 375
Hintern Theatre, undisclosed address.. 38
History, motion-picture, home-study course in 537
—, television, in England 522
Hollywood Theatre, Sioux Falls, S. D.....372, 374
Home, theatre combined with..... 461
Home-study, advantages of 536
management courses in 537
Hoo Hoo Theatre 91
Huntridge Theatre, Las Vegas, Nev.... 180
Hygeaire, air-sterilization by 491

I

Iconoscope, explanation of 565
Illumination, color and 111
signs and 177
Illustration, use of, home-study course in 538
Image-dissector, explanation of 565
Inconel, uses of 135
Indium, uses of 138
Indoctrination, method of 539
Infection, prevention of, in wounds... 510
Infiltration, air, prevention of 379
Insect(s), control of 498
principles of control of 502
recommended reading on control of 504
Insecticide (s), DDT as 503
discussion of 503
fumigation as 504
Gammexane as 503
insect-proofing as 504
poison-baits as 504
pyrethrum as 504
rotenone as 504
sodium fluoride as 503
soil treatment as 504
Insect-proofing, methods of 504
Insulation, electrical, Fiberglas in.... 114
plastics in 152
—, heat, Fiberglas in 113
—, sound, Fiberglas in 113
lead in 142
Insurance, automobile public liability.. 444
business interruption 444
Insurance, *continued*
elevator public liability 444
fidelity bonds 445
fire 445
holdup 445
machinery property damage 444
program for theatre owners on..... 444
public liability 444
safe burglary 445
workmen's compensation 444
Iodine, antidote for 513
Iron, uses of 134
—, galvanized, uses of 136

J

Jaw, dislocation of, first-aid treatment for 514
Jewell Valley Theatre, Jewell Valley, Va. 378

K

Kallett Drive-In 96
Kallett Theatre, Rome, N. Y. 14
Kaywood Theatre, Mount Ranier, Md... 180
Keratol, uses of 215
Koroseal, uses of 215

L

Lamp(s), filament, light characteristics of 220
—, fluorescent, light characteristics of... 220
—, germicidal, bactericidal effect of.... 486
characteristics of 486
duct installations with 488, 495
fixture installations with 487, 488, 489, 490, 491
maintenance of 487
replacement of 487
uses of 486
—, neon, light characteristics of..... 220
—, projection, rectifiers for 286, 287
Laurier Palace Theatre, Montreal, P. Q. 506, 507
Lavatories, fixtures for 279
Lavona Theatre 95
Law, home-study course on 537
Lay-out, home-study course on 538
Lead, decorative applications of 142
uses of 135, 140, 141, 142
utilitarian applications of 141
—, red, use of, in paint..... 142
—, sheet, uses of 143
—, white, use of, in paint..... 142
Leaks, prevention of 382
Leather, artificial, uses of 215
Leg, fracture of, first-aid treatment for.. 514
Legion Theatre, Mayfield, Ky. 221
Lelani Theatre, Honolulu, T. H. 58
Lens(es), coating of 299
low-reflection films for 299
Orthoscope auxiliary system for.... 293
—, Trans-Lux, notes on 470
—, wide-angle, notes on 470
Lice, control of 498
Lido Theatre, Mexico, D.F., Mexico.... 179
Light, black, installation of 217
uses of 216
—, sources, characteristics of 220
Lighting, auditorium 219
foyer 218
home-study courses in 538
interior 218
lobby 218
lounge 220
maintenance of 220
marquee 218
rest rooms 220
toilets 220
—, projection, amperage in relation to.. 287
large theatre requirements in..... 286
medium theatre requirements in.... 286
Lighting, projection, *continued*
principles of 285
requirements of 285
small theatre requirements in 285
theatre requirements of 285
—, stage, equipment for 231
Lindavista Theatre, Mexico, D.F., Mexico 179
Linoleum, maintenance of 187
Lithium, uses of 138
Lobby(ies), fire protection in 234
lighting of 218
remodeling of 165
use of fabrics in 209
Lorenzo Theatre, San Lorenzo, Calif.... 22
Loss, prevention of, as insurance..... 445
Lounge(s), lighting of 220
Lucite, uses of 150
Ludlow Theatre, Ludlow, Ky. 82
Luna Theatre, Chicago, Ill. 372

M

MacArthur Theatre, Washington, D. C... 28
Machines, vending, frozen foods sold through 526
Madison Theatre, Covington, Ky. 84
Magnesium, industry interest in 145
present state of industry 144
properties of 144
theatre interest in 146
uses of 137, 138, 144
Maintenance, outline of, for
air-conditioning 379
air filters 379
air outlets 382
bearings 379
belts, flat-drive 380
—, v-type 380
blowers 382
carpets 224
coils, air-cooled 380
—, cooling 380
—, heating 380
—, water-cooled 380
compressors, air-cooled 381
—, sealed-type 381
condensers, air-cooled 381
—, evaporative 381
—, water-cooled 381
controls, electrical 381
—, refrigerant 381
couplings 382
dampers 382
ducts 382
fans 382
fire extinguishers 235
floors, asphalt tile 186
—, carpeted 224
—, concrete 185
—, hard-surface 184
—, linoleum 187
—, marble 186
—, quarry tile 184
—, rubber tile 187
—, terrazzo 185
—, vitreous tile 186
—, wood 184
flywheels 382
fuses 382
gauges 382
generators 289
grilles 382
lamps, germicidal 487
lighting 220
metals 382
motors, alternating-current 383
—, direct current 383
nozzles, spray 383
popcorn machine 525
pulleys 380
refrigerants 383
screens, air-intake 383

Maintenance, *continued*
shafts ... 380
signs ... 177
Management, home-study courses in ... 537
services for efficient ... 420
training course for ... 536
Manager(s), opportunities for trained ... 536
—, assistant, opportunities for trained ... 536
Mancuso Theatre ... 103
Marble, maintenance of ... 186
Marble Arch Pavilion, London, England ... 533
Marquees, advertising space on ... 435
lighting of ... 218
Masonry, concrete, uses of ... 155
Mat(s), rubber, developments in ... 182
luminescence in ... 183
maintenance of ... 187
patron cleanliness served by ... 182
Matinee(s), building of, home-study course in ... 537
Meetings, staff, for instruction ... 539
Mercury, antidote for ... 512
Merrick Theatre, Jamaica, N. Y. ... 210
Metals, maintenance of ... 382
uses of ... 131
—, rare, uses of ... 137
Mexico, theatre construction in ... 168
theatre design in ... 168
Mezzanine, fire protection in ... 234
Mice, control of ... 504
Midtown Theatre, Detroit, Mich. ... 181
Mildew-proofing, fabric treatment for ... 214
Mirrors, see Reflectors
Molybdenum, uses of ... 139
Monel, uses of ... 135
Monseigneur News Theatre, London, England ... 569
Mosquitoes, control of ... 499
Moths, webbing clothes, control of ... 500
Moth-proofing, fabric treatment for ... 214
Motio Theatre, undisclosed address ... 72
Motion pictures, definition of terms ... 549
television and, in combined programs 561
television as an ally of ... 549
Motors, maintenance of ... 383
—, alternating-current, maintenance of ... 383
—, direct-current, maintenance of ... 383
Mozart Theatre, Washington, D. C., see Embassy Theatre, Washington, D. C.
"Murals in light," Plexiglas for ... 148

N

Neoprene, uses of ... 151
New Victoria Cinema, London, England ... 554
Nickel, uses of ... 135
Nickel-silver, uses of ... 133
Nose, foreign body in, first-aid treatment for ... 515
Nosebleed, first-aid treatment for ... 515
Nozzles, spray, maintenance of ... 383
Nylon, uses of ... 150, 211

O

Odeon Cinema, London, England ... 556
Opera, television of, in theatres ... 547
Optics, projection, advances in ... 293, 299
Organ-lofts, remodeling of ... 160
Organization, theatre, home-study course in ... 537
Orchestra, remodeling of ... 160
Overcrowding, fire tragedies due to ... 506
Owners, theatre, opportunities for trained ... 536

P

Paint, use of lead in ... 142
Paint-shop, fire protection in ... 234
Palace Theatre, Chicago, Ill. ... 222
Palladium, uses of ... 137
Panic, prevention of ... 540
Panels, plywood, construction with ... 4
Paramount Theatre, Saint John, N.B. ... 34
Personnel, fire-fighting organization of ... 540
inadequate training of, as tragedy cause ... 507
training of ... 536, 539
training course for ... 536
Pewter, uses of ... 136
Phenol, antidote for ... 512
Pit, orchestra, remodeling of ... 160
Pitts-Roth Theatre, North Emporia, Va. ... 56
Pix Theatre ... 93
Planning, community, theatres and ... 2
Plastacele, uses of ... 150
Plastics, interior uses for ... 152
pre-fabrication with ... 125
uses of ... 152
—, laminated, uses of ... 152
Playhouse, Ridgefield, Conn. ... 3
Plexiglas, properties of ... 147
"Murals in light" with ... 148
uses of ... 147
Plexon, uses of ... 215
Plumbing, developments in ... 278
use of lead in ... 141
Plywood, construction materials of ... 4
pre-fabrication with ... 5, 125
—, resin-bonded, uses of ... 125, 152
Poisons, antidotes for ... 512
first-aid treatment for ... 512
Polythene, uses of ... 150
Popcorn, business angles of ... 524
handling of, as grain ... 523
maintenance of equipment for ... 525
use of, in theatre operation ... 522
Porcelain enamel, see Enamel, porcelain
Post Theatre, Fort Sam Houston, Tex. ... 186
Posting, 24-sheet, advertising uses for ... 440
Potassium, uses of ... 138
Pre-fabrication, plastic-plywood in ... 125
post-war expansion and ... 128
state and city survey on ... 122
steel in ... 118
wood in ... 4
Production, home-study course in ... 537
Production(s), stage, television of, in theatres ... 547
Program(s), home-study course in ... 539
Program-building, home-study course in 537
Projection, home-study courses on ... 539
notes on ... 403
—, Trans-Lux, equipment for ... 470
Projection, see also Equipment, projection
Proscenium, decoration of ... 231
remodeling of ... 159
use of fabrics in ... 209
Pulley(s), maintenance of ... 380
Pyrethrum, use of ... 504
Pyromaniacs, fires caused by ... 506

R

Races, television of, in theatres ... 546
Radio City Music Hall, New York, N. Y. 133
Rats, control of ... 504
Rayon, use of ... 211
Receivers, television, operation of ... 566
Records, cash-control, maintenance of ... 450
—, equipment, maintenance of ... 449
—, film-booking, maintenance of ... 447
—, film-buying, maintenance of ... 447
—, financial, maintenance of ... 450
—, management, maintenance of ... 449
Rectifiers, high-intensity-lamp use of ... 287
low-intensity-lamp use of ... 286
—, copper-oxide, circuits for ... 292
construction of ... 291
discussion of ... 291
Rectifier, copper-oxide, *continued*
electrical characteristics of ... 291
installation of ... 292
life of ... 292
operation of ... 292
ratings for ... 292
technical details on ... 291
theatre applications of ... 292
Reese Theatre, Harrington, Del. ... 460
Reflection, elimination of ... 301
principles of ... 301
Reflector(s), developments in ... 297
diameter of ... 287
manufacture of ... 296
principles of ... 287
Refrigerants, care of ... 383
Regulations, construction, home-study course in ... 538
Rey, El, Theatre, Wasco, Calif. ... 48
Remodeling, light requirements in ... 162
materials for ... 163
problems in ... 158
redecoration and ... 162
sound requirements in ... 162
suggestions for, in foyers ... 165
—, in fronts ... 165
—, in lobbies ... 165
—, on stages ... 159
—, of stairs ... 160
—, of stores into theatres ... 130
vision requirements in ... 161
Resin, Paraplex, uses of ... 215
Rest rooms, see Lounges *and* Toilets
Rhodium, uses of ... 139
Rialto Theatre, Chicago, Ill. ... 134
Louisville, Ky. ... 187
Rio Theatre ... 94
Riverview Theatre, Norfolk, Va. ... 12
RKO Strand Theatre, Dayton, O. ... 505
Road-showing, opportunities ... 129
problems of ... 129
Roc Theatre, undisclosed address ... 40
Rodent(s), control of ... 504
Rodenticides, poison baits as ... 504
Rodeo Theatre, Salinas, Calif. ... 32
Rogers, Will, Theatre, Chicago, Ill. ... 154, 180
Roof(s), considerations of ... 166
coverings for ... 166
drainage of ... 167
flashing for ... 167
profit area made on ... 460
Roof-garden, space utilized for ... 460
Roofing, use of lead in ... 141
Room(s), power-equipment, design of ... 328
—, projection, construction of ... 326
design of ... 326
See also Booth, projection
—, rewind, design of ... 328
Rotenone, use of ... 504
Royal Theatre, Miami, Fla. ... 181
Rubidium, uses of ... 138

S

Safety, carpets as factor in ... 222
violation of regulations of, as fire tragedy cause ... 506
Saint James Theatre, Asbury Park, N. J. ... 223
Saint Laurent, Montreal, P. Q. ... 46
Sandia Theatre ... 91
Sanitation, modern plumbing to achieve ... 281
Saran, use of ... 212
Scalds, first-aid treatment for ... 513
Scale, decoration essential in ... 208
Scandium, uses of ... 138
Screens, intake, maintenance of ... 383
—, rear-projection, description of ... 469
—, Retiscope, description of ... 284
—, Trans-Lux, description of ... 469
Seat(s), design, space-use and ... 228
Seating, arrangement of ... 227

Seating, *continued*
balcony installation of 227
compound layout of 227
continental layout of 228
curved layout of 227
fan-shaped layout of 227
installation of 226
remodeling of 160
reverse inclines in 227
sight lines in 161, 165, 226
straight layout of 227
Selenium, uses of 139
Service, detective agency, management and 423
—, fire department, management and ... 424
—, janitorial, management and 422
—, police department, management and 424
—, projection, management and 421
—, sanitary, management and 422
—, sound, management and 421
Shafts, maintenance of 380
Shock, first-aid treatment for 509
—, electric, first aid treatment for.... 511
Shrink-proofing, fabric treatment for .. 214
Sierra Theatre, Delano, Calif. 16
Sign(s), illumination of 177
inspection of 178
maintenance of 177
painting of 178
utilization of 178
—, traveling message, advertising value of 437
—, Wondersign, advertising value of ... 437
Silastic, uses of 215
Silver, uses of 137
Silverfish, control of 502
Smokers, fires caused by 506
Sodium fluoride, use of 503
Sound, see Equipment, sound
Sound-proofing, use of lead in 142
Spine, injury to, first-aid treatment for 514
Splints, use of 514
Sprains, first-aid treatment for 515
Staff(s), home-study course on 537
Stage(s), costs of 229
design of, ... 229
—, home-study course on 538
furnishing of 229
lighting for 231
remodeling of 159
Stairs, remodeling of 160
Stalls, toilet, modern equipment for ... 280
Standees, advertising, uses for 432
State Theatre, Red Bluff, Calif. 24
Shafter, Calif. 64
Steel, pre-fabricated theatres of 118
uses of 134
—, galvanized, uses of 136
—, low-carbon, uses of 134
—, stainless, fabrics of 213
uses of 134
Strains, first-aid treatment for 515
Strand Theatre 103
Strand Theatre, Wildwood, N. J. 44
Strangulation, first-aid treatment for ... 511
Stratification, air, elimination of 377
Stuart Theatre, Lincoln, Neb. 180
Supply dealers, list of, in—
Africa 404
Alabama 394
Alberta 403
Arizona 394
Asia 404
Australia 405
British Columbia 403
British Guiana 405
British West Indies 405
California 394
Canada 403
Central America 405
Colorado 394
Supply dealers, *continued*
Connecticut 394
District of Columbia 395
Europe 406
Florida 395
foreign 404
French West Indies 406
Georgia 395
Hawaii 406
Illinois 395
Indiana 396
Iowa 396
Kansas 396
Kentucky 396
Louisiana 396
Manitoba 403
Maryland 396
Massachusetts 396
Michigan 397
Minnesota 397
Missouri 398
Nebraska 398
Netherlands West Indies 406
New Jersey 398
New Mexico 398
New York 398
New Zealand 406
Newfoundland 403
North Carolina 399
North Dakota 309
Nova Scotia 403
Ohio 400
Oklahoma 400
Ontario 403
Oregon 400
Pennsylvania 400
Persian Gulf 407
Philippine Islands 407
Quebec 403
Rhode Island 401
South America 207
South Carolina 401
South Dakota 401
Straits Settlements 407
Tennessee 401
Texas 402
United States 394
Utah 402
Vermont 402
Washington 402
West Indies 407
West Virginia 402
Wisconsin 402
world 404

T

Tabula Theatre 97
Tantalum, uses for 139
Tatler Newsreel Theatre, London, England 553
Tele Theatre, undisclosed address 74
Telenews Theatre, San Francisco, Calif. 508
Television, American theatremen consider 569
cathode-ray-tube projection in 554
charges in 559
cinema standards and 556
cinematic comparisons with 550
color development in 560
costs in 559
definition of terms 549
economic angles of 549
economic aspects of 545
effect on theatres of 545
experience with, in Britain 552
films and, in combined programs ... 561
future of 548
generators in 564
history of, in Britain 552
iconoscope use in 565
image dissector use in 565
Television, *continued*
imperfections of 550
independent amusement in 544
independent service for theatres in .. 561
installation of equipment for 557
intermediate film projection in 554
library material available for 550
light-valve systems in 555
mechanical systems in 554
motion-pictures as ally of 549
news presentation by 550
pick-up phase of 547
possibilities of 545
possibilities for theatres 546
principles of, explained 563
production costs in 550
program distribution in 559
progress in electronic method in ... 561
receiver operation in 566
scanning rate in 566
sight-sound differences in 564
"searchlight" beam in 565
standards in 566
still vs. moving transmission in 565
theatre angles of 548, 551
theatre's interest in 551
theory of, explanation 564
transmission data for 566
—, broadcast, history of British 553
—, equipment, for theatres 556, 570
—, large-screen, future of 551
—, theatre, box-office charges in 562
box-office requirements for 560
English experience with 553
equipment for 556, 570
future developments in 556
home reception and 560
operation of 558
potentialities of 569
system of 555
See also Television
Tellurium, uses of 139
Termites, control of 501
Terrazzo, maintenance of 185
Terson, uses of 215
Textiles, developments in 211
Textiles, see also Fabrics
Thallium, uses of 138
Theatre(s), evacuation of, in emergencies 540
home combined with 461
post-war plans for 12
television for 545
—, drive in, booth-building construction 475
equipment for 477
grading of 473
notes on 471
post-war plans for 101
ramp construction in 473
screen-tower construction in 474
site selection in 472
—, "Drive Over and Drop In," construction of 105
channels for 106
costs of 107
income from 108
operating expenses of 108
year-'round operation of 105
—, pre-fabricated, plastic-plywood in .. 125
steel in 118
wood in 4
—, 16mm. design ideas for 125, 483
equipment for 483
future of 484
notes on 483
pre-fabrication for 125
product for 483
—, Trans-Lux, advantages of 468
future of 470
notes on 468
projection rooms for 470
rear-projection screen for 469

Theatres, Trans-Lux, *continued*
wide-angle lenses for 470
Theatre-Home, new design
for living in 461
Tile, asphalt, maintenance of 186
—, quarry, maintenance of 186
—, rubber, maintenance of 187
—, vitreous, maintenance of 186
Tin, uses of 136
Toilets, design of 278
equipment for 278
lighting of 220
planning of 279
Tolex, uses of 215
Toothache, first-aid treatment for 515
Tourniquet, first-aid use of 509
Tower Theatre, Marysville, Calif. 187
Town Theatre 95
Training, personnel, need for 536
Trans-Lux Theatre, New York, N. Y.
(85th Street) 373
New York, N. Y. (52nd Street) ..373, 374
Washington, D. C. 132
Trocadero Theatre,
Montevideo, Uruguay 170
Troy Theatre, Troy, O. 86
Tubes, cathode-ray, explanation of 564
—, *photo-electric, see* Cells,
photo-electric
—, vacuum amplifier, explanation of .. 563
Tungsten, uses of 139
Tuskegee Theatre, Tuskegee, Alabama .. 70
Type, use of, home-study course in 538

U

Unconsciousness, first-aid
treatment for 513
Unions, maintenance of 382
University Theatre, Columbus, O. 88
Unnamed theatres,
undisclosed addresses .. 18, 50, 94, 95
Uranium, uses of 139
Urinals, modern equipment in 282
Uruguay, theatre design in 170

V

Valley Drive-In, Harlingen, Tex. 181
Velon, uses of 212
Vending machines, see
Machines, vending
Ventilation, home-study course in 538
Vinyon, use of 212

W

Wahouma Theatre, Birminghom, Ala. .. 54
Water-proofing, fabric methods for 214
use of lead for 141
Wayne Theatre, Wayne, Mich. 68
Webster, Hartford, Conn. 222
Wellman Theatre 103
Windpipe, foreign body in, see Choking
Wiring, electric, fires caused by 505
Wood, construction materials from.... 4
maintenance of floors of 184
Wounds, lacerated, first-aid
treatment for 511
—, punctured, first-aid treatment in ... 511

Z

Zapon, uses of 215
Zinc, uses of 136
Zirconium, uses of 139

Cumulative Index to the Previous Editions

Topical References to All of the Articles Published in Prior Volumes of This Series

A

Acoustics, decorative aspects of .. 1941:154
design-planning for 1941:152
faults in over-accentuating 1942:192
recommendations for 1941:246
Advertising, basic sales
appeals in 1941:297
suggestions on 1942:287
Air-cleaners, electrostatic, use of .. 1942:325
Air-conditioning, air side of 1941:317
don'ts on 1941:316
equipment
maintenance in ...1941:328, 1942:319
types of 1941:330
Air-raids, precautions for 1942:304
Amortization, rates on 1941:265
Appeals, feminine,
in rest-room design 1941:124
Arcs, carbon, efficient
application of 1941:223
requirements for 1942:219
terminology of 1942:231
—, low-intensity,
history of use of 1942:247
Auditoriums, dual, case for 1942: 17
Awards, "Perfect 36" 1942: 9

B

Bookkeeping, simplified
system of 1941:286
Booth, projection, equipment
requirements for ..1942:243, 1942:260
location of 1942:260
planning of 1941:202
Boxoffices, effective location for .. 1941:182
Buildings, depreciation of 1941:265

C

Calendar, clearance, use of 1941:284
—, pest-control, use of 1942:292
Candy, vending of 1941:270
Care, of carpets 1941:140
Carpets, care and
cleaning of 1941:140, 1942:296
installation of, rules for 1942:173
maintenance of 1941:140
utilization of, in decoration .. 1942:165
Cleaners, air, electrostatic,
use of 1942:325
Clearance, calendar for calculating 1941:284
Codes, building, construction and 1941: 21
Color, use of, in decoration 1941:122
Comfort, patron, minimum
essentials for 1941:169
Concessions, see also Machines,
vending *and specific item*
Conduct, rules of, for house staffs 1941:262
Construction, building codes and
ordinances in relation to .. 1941: 21
economies effected in 1942:141
functional design in 1941: 22
problems in small
communities 1942:298
seating plans considered for .. 1942:157
Conservation, equipment
care to aid 1942:278a
Cooling, don'ts on 1941:316
prevention of wartime
breakdowns in 1942:331
Counter, candy, operation of 1941:277
Crowds, handling of 1941:266
Cushions, carpet, standards
for use of 1942:169
use of 1942:169

D

Damage, suits for,
safeguards against 1941:297
Dampers, fire, smoke circulation
prevented by 1942:328
Dealers, supply,
Canada, listing of ...1941:300, 1942:308
United States
listing of 1941:300, 1942:308
Decoration, color schemes in 1941:122
use of acoustics in 1941:154
use of carpets in 1942:165
—, auditorium, use of
acoustics in 1941:154
—, wartime, color in 1942:188
rhythm in 1942:188
Demands, public, on theatremen .. 1941:264
Depreciation, rates on 1941:265
of buildings 1941:265
of equipment 1941:265
Design, drive-in, plan for 1942:145
—, rest-room, feminine appeal in .. 1941:124
—, theatre, adaptation to locale .. 1941: 10
functional ornamentation in .. 1941: 22
future developments in 1941: 12
glass utilization in 1941:178
maintenance as a factor in 1941: 20
"Perfect 36" awards for 1942: 9
plastics utilization in 1941:178
porcelain utilization in 1941:178
seat-spacing and sight lines in .. 1941:118
utility in 1941: 20
Devices, safety, for
air-conditioning systems ... 1942:328
Draperies, use of,
in theatre design 1941:131

E

Economies, procurement of,
in construction 1942:141
Effects, directional,
with rubber mats 1942:216
Equipment, depreciation of 1941:265
general conservation of 1942:278a
—, air-conditioning,
maintenance of ...1941:328, 1942:319
Exploitation, advertising and 1941:292
basic appeals in 1941:297
reminiscences on feats of 1941:292
suggestions on advertising in .. 1942:287
trailers and 1941:242
Extinguishers, location of 1942:276
maintenance of 1942:276

F

Fabrics, use of, in theatre design .. 1941:131
—, upholstery, principles of
wearing in 1942:149
service potentials in 1942:149
wearing quality of 1942:149
Filters, air, comparison of
types of 1942:325
Financing, through Reconstruction
Finance Corporation 1941: 13
Fire-fighting, maintenance of
equipment for 1942:276
Fire-prevention, maintenance of
equipment for 1942:276
First-aid, materials for 1942:304
Fronts, glass utilization in..... 1941:178
ideas for 1942:199
plastics utilization in 1941:178
porcelain utilization in 1941:178

G

Glass, use of in theatre design ... 1941:178
Good-will, procurement of,
from standees 1941:266
Grosses, remodeling as
stimulant for 1941:281

H

Housekeeping, as aid to
pest control 1942:292

I

Insects, control of 1942:292
Installation, carpet, rules for 1942:173

L

Lamps, low-intensity,
history of use of 1942:247
Law suits, damage,
safeguards against 1941:297
Leakage, fiscal, prevention of 1942:272
Lenses, projection, effects, of 1941:241
improvements in 1941:241
Letters, changeable,
typography of 1941:176
Light, black, showmanship
possibilities of 1942: 12
utilization of 1942: 12
Lighting, indirect, theatre
possibilities of 1942: 19
—, projection, efficient
application of 1941:223
Locale, adapting theatre
design to 1941: 10

M

Machines, vending,
for amusements 1941:270
for candy 1941:270
for personal service 1941:270
for popcorn 1942:270
Maintenance, of air-conditioning
equipment 1941:328, 1942: 31
of carpets 1941:140
practical observation on 1941:290
—, wartime, in cooling systems ... 1942:231
Management, quality buying
as economy in 1941:298
—, theatre, essentials of
comfort in 1941:169
handling standees 1941:266
progress report on 1941:278
public demands of 1941:264
Marquee, design of,
for showmanship 1941:194
utilization as selling aid 1941:194

Materials, building,
analysis of uses of 1941: 17
first-aid 1942:304
—, non-defense, use of,
in remodeling 1942:177
Mats, rubber, carpet protection
with 1942:177, 1942:216
installation of 1942:177
traffic direction with 1942:216

N

Nosing, stair, installation
of rubber 1942:177
use of, to save carpets 1942:177

O

Ordinances, building,
theatre construction and ... 1941: 21

P

Performance, standards of,
for sound 1941:210
Pests, control of, in auditoriums .. 1942:292
Planning, acoustical 1941:152
projection room 1941:202
Plastics, use of, in design 1941:178
Popcorn, vending of 1941:270
Porcelain, use of, in design 1941:178
Precautions, air-raid 1942:304
Projection, standards of 1941:228
Projection-rooms, see
Booth, projection
Projectors, use-life of 1941:226
Protection, carpet,
rubber mats for 1942:216
Purchasing, quality, economy in .. 1941:298

R

Recommendations, for
theatre acoustics 1941:246
Reconstruction Finance Corporation
financing through 1941: 13
Records, system of keeping,
on business 1942:267
system of keeping,
on equipment 1942:267
Remodeling, as boxoffice
stimulant 1941:281
—, wartime, necessity for 1942:177
non-defense material in 1942:177
Renovation, as boxoffice
stimulant 1941:281
Rest-rooms, appeal of, to women .. 1941:124
Requirements, for
projection arcs 1942:219
for projection booth
equipment 1942:243
Requirements, see also Standards
Rules, for conduct of
house staffs 1941:262
for seat installations 1942:157

S

Seating, hand signals
for indicating 1941:267
patron comfort in plan for ... 1942:153
proper spacing of 1941:118
rules for installation of 1942:157
sightlines in plan for 1942:153
Showmanship, selling power of .. 1941:194
Sightlines, determination of 1942:153
Signals, hand, for quick seating .. 1941:267
Signs, attraction, typography of .. 1941:176
design for showmanship in ... 1941:194
utilization as selling aid 1941:194
Sound factors affecting quality of .. 1942:233
performance standards for 1941:210
Staffs, house,
rules of conduct for 1941:262
Standards, of acoustics 1941:246
of building, analysis of 1941: 17
of carpet cushions 1942:169
of projection arcs 1942:219
of theatre projection 1941:228
of theatre sound 1941:210
Standards, see also Requirements
Standees, procuring
good will from 1941:266
Systems, bookkeeping,
simplified for theatres 1941:286
card index, for
maintenance records 1941:290
cash-control, use of 1942:272
Cooling, wartime
maintenance of 1942:331
optical, in projection 1941:241
record, use of 1942:267

T

Terminology, for carbon arcs 1942:231
Theatres, drive-in, equipment for .. 1942:145
growth of 1942:145
list of: United States 1942:145
operation of 1941: 15
plan for 1942:145
—, open-air, operation of 1941: 15
Theatres, open air, see also
Theatres, drive-in
Typography, principles of,
as applied to signs 1941:176

V

Vermin, control of,
in auditoriums 1942:292

The 1945 Index to All Advertised Products

Materiel and Services Are Listed to Provide Quick Answers to the Theatreman's Questions

A

Air-conditioning, Governair 386
—, units, Governair 386
Kooler-Aire 388
Prop-R-Temp 387
Unitaire 389
Westinghouse 389
—, year-'round 388
Air-diffusers, Air-Lite 260
Anemostat 390
Air-sterilization, Hygeaire system 518
Air-washers, see Washers, air
Amplifiers, sound-system, DeVry 339
RCA 334
Royal Soundmaster 343
Simplex 333
Synchrofilm 344
—, volume-control, Simplex 333
Artists, design, Novelty Scenic 244
Atomizers, Typhoon 387

B

Bars, pull, Sealuxe 196
—, push, Sealuxe 196
aluminum, New York Brass 197
cast bronze, New York Brass 197
Bases, projector, Royal Soundmaster ... 343
Blowers, Typhoon 387
—, electric, Tornado 412
Bolts, panic, Von Duprin 276
—, self-releasing, Von Duprin 276
Booths, ticket, Poblocki 194
Sealuxe 196
Box-offices, see Booths, ticket
Boxes, ticket, Goldberg 415
Golde 369
Builders, Riseman 251
Bulbs, rectifying, Rectigon 409

C

Carbons, projector, National 367
Orotip 367
Suprex 367
Carbon-savers, Best 368
Carpets, Bigelow-Sanford 258
Crestwood 252, 256
Mohawk Traffic-Tred 254
Cases, poster, Poblocki 194
Cement, film, 2-in-1 370
Chairs, Bodiform 264
International 267
Push-Back 266
Streamliners 265
Change-overs, Strong Zipper 364
Weaver 417
Chillers, water, Westinghouse 389
Cleaners, vacuum, Exidust portable 411
Exidust stationary 411
Super portable 413
Tornado portable 412
Coils, direct-expansion, Monsoon 387
—, heating, Monsoon 387
—, miscellaneous, Westinghouse 389
—, water, Kooler-Aire 388
Monsoon 387
Coin-changers, Johnson Lightning 201
Vendo 534
Compressors, Westinghouse 389
Condensers, evaporative, Aquamizer ... 389
Kooler-Aire 388
Typhoon 387
Westinghouse 389
—, water-cooled, Westinghouse 389
Controls, curtain, Aero-Speed 272
Junior No. 40 272
Weaver 417
Weiss 198
—, lighting, Adam 268
Ward Leonard 269
Wurdack 270
Coolers, water, Kelvinator 519
Coverings, wall, Goodall 241
Tolex 237
Weiss 198
Curtains, asbestos, Weiss 198
—, cyclorama, Weiss 198
—, exit, Weiss 198
—, fabrics, Maharam 241
—, light-proof, Weiss 198
—, miscellaneous 198
—, stage, Weiss 198
Cycloramas, Weiss 198

D

Decoration, black light, Black Light ... 248
—, fabrics, Maharam 241
—, general, Novelty Scenic 244, 245
Schumacher 242
—, interior, Draper 249
Novelty Scenic 247
Paramount 250
Riseman 251
Weiss 198
—, materials, Maharam 241
—, paneling, Marlite 206
—, planning service, Novelty Scenic ... 245
Decorators, mail-order service, Novelty Scenic 246
Deodorants, Fort-a-Cide 516
Designers, Riseman 251
Diffusers, air, Air-Lite 260
Anemostat 390
Dimmers, auto-transformer, Ward Leonard 269
—, reactance, Ward Leonard 269
—, resistance, Ward Leonard 269
—, stage-lighting, Adam 268
Disinfectants, Fort-a-Cide 516
Fumitol 370
Displays, general, Sealuxe 196
—, lobby-units, Wagner 191
—, poster, Poblocki 194
—, wall, Ramco 195
Divans, adjustable-arm, Schumacher ... 242
Doors, lobby, Formica 205
Downlights, see Lights, down
Draperies, auditorium, Novelty Scenic 245, 247
—, fabrics, Maharam 241
—, general, LaFrance 240
Novelty Scenic 245
Weiss 198
—, stage, Novelty Scenic 245, 247
Weiss 198

E

Effects, lighting, Weiss 198
—, spectacular, Novelty Scenic 247
Ends, rope, New York Brass 197
Equipment, cooling, National 384
—, drive-in projection, RCA 337
—, drive-in sound, RCA 337
—, 16mm., DeVry 339
—, stage, Clancy 273
Kliegl 274
Weiss 198
Etching, Novelty Scenic 245
Exhausters, Usairco 388
Extinguishers, fire, Alaskan 520
CD/Fog 520
Floafome 520
Pacemaker 520
Protector 520
Red Star 520
S. O. S. Fire Guard 520

F

Fabrics, drapery, LaFrance 240
—, Fiberglas, Thortel 243
—, fire-proof, Thortel 243
—, miscellaneous, Dazian 238
Goodall 239
Maharam 241
—, seating, LaFrance 250
—, tapestry, LaFrance 240
—, upholstery, Tolex 237
—, wall, Novelty Scenic 244, 246
Fans, National 385
Typhoon 387
Usairco 388
—, cooling, National 384
Fiberglas, fabrics, Thortel 243
Film, cleaner, Vita 370
Fire-proofing, Gothoil 370
Fixtures, lighting, Kliegl 274
Voigt 261, 262
Flame-proofing, powder, Hewes-Gotham 370
Footlights, see Lights, foot
Fountains, drinking, Kelvinator 519
Voigt 259
Frames, banner, Reliance 195
—, marquee, Adler 188
Wagner 190
—, poster, Poblocki 194
Sealuxe 196
Fronts, aluminum, Sealuxe 196
—, porcelain enamel, Davidson 1
Sealuxe 196
Fumigants, Fumitol 370

G

Generators, Century-Roth 355
Stedypower 356
Transverter 353
Grilles, aluminum, New York Brass... 197
—, bronze, New York Brass 197
—, metal, Deflecto 388
—, stainless steel, New York Brass 197
—, steel, New York Brass 197
Guards, door, aluminum, New York Brass 197
brass, New York Brass 197

H

Hardware, stage, Weiss 198

I

Insecticides, Bu-Tox 370
Lethal 370

L

Labor-union, projectionist 427
Lamps, coloring, Vitro 370
—, fluorescent, GE Circline 410
GE Slimline 410
Westinghouse Circline 409
Westinghouse ordinary 409
Westinghouse Slimline 409
—, germicidal, GE 410
—, incandescent, GE 410
Westinghouse 409
—, infra-red, GE 410
—, night-lights, GE 410
—, reflector, GE 410
—, sealed-beam, GE 410
—, silvered-bowl, GE 410
—, three-light, GE 410
—, photo-flash, GE 410
—, photo-flood, GE 410
—, projection, Brenkert Enarc 336
Forest 1-kw. 350
GE 410
Lightmaster 343
Peerless Hy-Candescent 351
Peerless Magnarc 351
Simplex High 1-kw. 348
Strong 1-kw. 346
Strong Junior High 346
Strong Mogul 346
Strong portable 35-mm. portable 346
Universal Trim 350
—, sunlamps, GE 410
Leather, genuine, LaFrance 240
—, imitation, LaFrance 240
Lenses, projection, Pro-Jex 359
Snaplite 358
Super Cinephor 357
Super-Lite 359
Light, black, Black Light 248
Letters, aluminum, Wagner 191
—, plastic, Bevelite 192
Third-dimension 188
Lighting, cove, Voigt 262
—, fixtures, Voigt 261
—, fixtures, Kliegl 274
—, stage, Adam 268
Ward Leonard 269
Wurdack 270
—, theatre, Kliegl 274, 275
Lights, border, Kliegl 275
Weiss 198
—, cyclorama, Kliegl 275
—, down, Kliegl 274
Rambusch 263
Voigt 260
—, flood, Kliegl 274, 275
Weiss 198
Westinghouse 409
—, foot, Weiss 198
—, poster, Kliegl 274
—, program, Kliegl 275
—, spot, Bantam super-spot 369
Best PeeWee 368
Best Wonder 368
Bestomatic color 368
Kliegl 275
Weiss 198
—, walk, Kliegl 274
Liquid, fire-extinguishing, Hewes-Gotham 370
Lobbies, equipment, New York Brass 197
—, fabrics, Maharam 241
Loudspeakers, DeVry 339
RCA 334
Royal Soundmaster 343
Voice of the Theatre 363
Lugs, terminal, Best 368

M

Machines, curtain, Autodrape 271
Automatic Devices 271
Silver Service 271
Mats, corrugated, American 202
—, metal ends, Jackson 203
—, name, American 202
—, rubber, Ameritred 202
Ezy-Rug 202
Jackson 203
Lorraine 204
—, steel, American 202
—, wood-slat, American 202
Motors, curtain, Weiss 198
—, squirrel-cage, Stedypower 356
Motor-Generators, Stabilarc 271
Murals, design and execution, Novelty Scenic 244
—, glass, Novelty Scenic 244
—, painted, Novelty Scenic 246
—, plaster, Novelty Scenic 244

N

Nosing, rubber, Jackson 203
—, safety, Lorraine 204
—, safety-metal, Jackson 203

O

Openings, conversation, New York Brass 197
Outlets, star, Kliegl 275

P

Paint, screen, Five Star 370
Painters, Novelty Scenic 244
Paneling, ceiling, Marlite 206
—, leatherette-tufted, Novelty Scenic 246, 247
—, plastic-finished, Marlite 206
—, wall, Marlite 206
Pans, brass, New York Brass 197
Perfume, spray, Hewes-Gotham 370
Plaques, ornamental, Novelty Scenic .. 246
—, Sculptured plaster, Novelty Scenic .. 246
Plates, kick, Sealuxe 196
—, wall, New York Brass 197
Weiss 198
Popcorn, bags, Poppers Boy 527
—, boxes, Poppers Boy 527
—, grain, Poppers Boy 527
—, machines, Dunbar centralized 532
Dunbar lobby models 532
Manley 529
Super Star 530
Viking 531
—, salt, Poppers Boy 527
—, seasoning, Poppers Boy 527
Posts, lobby, Sealuxe 196
—, permanent standee, New York Brass 197
—, portable, heavy-loaded, New York Brass 197
—, removable, standee, New York Brass 197
Posts, see also Standards
Projection, carbon-savers, Best 368
Projectors, gears, LaVezzi 365
—, parts, LaVezzi 365
Projection Products 366
—, slide, Air-Flo 369
Best Automatic 368
Best 1,000-watt 368
Best 1,500-watt 368
Bestopticon 368
—, theatre, Ace Pro-40 345
Brenkert 335
Century 341
DeVry 338
Motiograph 342
Simplex E-7 330
Projectors, *continued*
Super Simplex 331
Superior 340
Synchrofilm 344
Pulleys, rewind, Best 368
Pumps, spray, Indian 517
Purgers, Little Giant 392

R

Railing, custom-built, Reliance 195
—, hand, bronze, New York Brass 197
Chrome, New York Brass 197
—, ticket-office, brass, New York Brass 197
chrome, New York Brass 197
Receptacle, ticket, Reliance 195
Rectifiers, bulb, Baldor 355
Forest LD-30 350
Forest LD-60 350
Kni-Tron Deluxe 354
Kni-Tron Master 354
National 2-tube 349
National 4-tube 349
National 6-tube 349
Strong 2-tube 347
Strong 4-tube 347
Strong 6-tube 347
—, copper-oxide, GE 352
Strong 347
Westinghouse 355
—, magnesium-copper sulphide, Forest Super 350
Reels, cast-aluminum, Goldberg 415
Weaver 417
Reflectors, equipment, Kni-Tron 354
—, projection, National 349
Strong 347
Registers, ticket, Speed-a-Ticket 199
Rewinders, automatic, Best 369
Goldberg 415
Rigging, stage, Weiss 198
Rock wool, acoustical, Weiss 198
Rope, chain-core, Weiss 198
—, cotton-strand, Weiss 198
—, hose-chain-core, New York Brass 197
—, velour, New York Brass 197
Runners, stair, American 202

S

Safes, box-office, Ballam 414
Scenery, materials, Weiss 198
Screens, ceiling, Radiant 361
—, lace-and-grommet, Radiant 361
—, rope-and-pulley, Radiant 361
—, spring-roller, Radiant 361
—, surface-processed, Forest 350
Textileather 237
—, theatre, Radiant 361
RCA Silverlite 355
RCA Snowhite 355
RCA Snowhite heavyweight 355
Retiscope 360
Walker plastic-molded 362
—, wall, Radiant 361
Sculptors, Novelty Scenic 245
Seating, adjustable-arm divans, Schumacher 242
Service, acoustic engineering, RCA Service 426
—, market research, Ross Federal 428
—, portable equipment, RCA Service 426
—, projection, RCA Service 426
—, sound, Altec 425
RCA Service 426
—, stage-planning, Clancy 273
Kliegl 274
Settings, cyclorama, Weiss 198
Showcases, candy, Columbus 533
Shutters, fire, Best 368
Signs, directional, Kliegl 274
Voigt 260

Signs, *continued*
—, exit, Kliegl 274
Voigt 262
—, frame, Locked-in-line multi-decker .. 183
Remova-Panel 188
Window-type 190
—, location, Voigt 260
Sockets, floor, New York Brass 197
—, floor-case, New York Brass 197
Sound, theatre, Ace WSR-2 345
Blue Seal 340
Century 341
Motiograph-Mirrophonic 342
RCA 334
Royal Soundmaster 343
Simplex Four-Star 332
Synchrofilm 400 344
Sound-Proofing, Weiss 198
Stages, equipment, Clancy 273
Weiss 198
Stages, lighting controls, Adam 268
Ward Leonard 269
Wurdack 270
Standards, permanent, Weiss 198
—, portable, Weiss 198
—, removable, Weiss 198
Strips, cove, Kliegl 274
Supply-dealers, Canada 403
export trade 418
mail-order 416
United States 394, 395, 396, 397, 398, 399, 400, 401, 402
World 404, 405, 406, 407
Switchboards, dimmer, Wurdack 270
—, stage, Adam 263
Wurdack 270
Switches, foot, Weaver 417

T

Tape, standee, Weiss 198
Tapestries, LaFrance 240
Thresholds, aluminum, New York Brass 197
—, bronze, New York Brass 197
Tracks, curtain, ADC Besteel medium-duty 271
ADC Silent-Steel heavy-duty 271
Vallen noiseless rear-fold 272
Weaver 417
Treads, stair, American 202
Jackson 203
Tubes, rectifying, Forest 350
—, no-draft speaking, Goldberg 415
Sealuxe 196
Turnstiles, entrance, Magic Barrier 200

U

Upholstery, leathercloth, Texileather ... 237
Urns, sand, New York Brass 197

W

Washers, air, National 385
Typhoon 387
Water-proofing, Gothoil 370
Wheels, color, Best 368